

Nicholas J. Owad

Curriculum Vitae

Department of Mathematics and Statistics
Colby College
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EDUCATION

Ph.D. Mathematics, University of Nebraska-Lincoln August 2016
Advisors: Mark Brittenham and Susan Hermiller

M.S. Mathematics, University of Nebraska-Lincoln May 2013

B.S. Mathematics and Physics, Kutztown University of Pennsylvania May 2010
Advisor: Anke Walz

AWARDS

MCTP Fellowship Spring 2015
Fellowship funded by the UNL Mathematics Department's *Mentoring Through Critical Transition Points* grant from the National Science Foundation.

Don Miller Outstanding GTA Award 2014-2015
An award given to experienced students who demonstrate exceptional promise as a teacher.

EMPLOYMENT

Colby College
Visiting Assistant Professor Fall 2019 to Present

Okinawa Institute of Science and Technology
Postdoctoral Scholar Fall 2017 to Summer 2019

Gettysburg College
Visiting Assistant Professor Fall 2016 to Spring 2017

University of Nebraska-Lincoln
Graduate Teaching Assistantship Fall 2011 to Spring 2016
Graduate Research Assistantship Spring 2014
Supported by NSF grant DMS-1313559, P.I. Susan Hermiller

Kutztown University of Pennsylvania
Undergraduate Teaching Assistant Fall 2009
Math Tutor Fall 2008 to Spring 2010
Assistant Coordinator of the Tutoring Center Fall 2009 to Spring 2010

RESEARCH INTERESTS

My research is primarily in topology and geometry: knot theory and low dimensional topology. Specifically, I study topological, geometric, and diagrammatic invariants of knots such as bridge number and volume. I have introduced a new invariant called the straight number of a knot and write programs in python and javascript to assist my work. I also have interests in geometric methods in group theory, 3D modeling and printing and their applications to research and visualizations of mathematical concepts.

PUBLICATIONS

The tunnel number of all 11 and 12 crossing alternating knots, with F. Castellano-Macías*, Submitted. [arXiv:1908.01693](#) [math.GT]

Explicit computation of the tunnel numbers of all alternating 11 and 12 crossing knots. The result of leading an undergraduate research project.

Families of not perfectly straight knots. Accepted for publication in *The Journal of Knot Theory and its Ramifications*, 2019. [arXiv:1804.04799v2](#) [math.GT]

We present the first families of knots known to have straight number strictly higher than crossing number.

Straight Knots. Submitted. [arXiv:1801.10428v2](#) [math.GT]

The diagrammatic invariant straight number is introduced and some of its properties are examined, including its relation to crossing number.

Bridge spectra of cables of 2-bridge knots. *The Journal of Knot Theory and its Ramifications*, **27** (02), (2018): 1850012.

We calculate the bridge spectra of cables of 2-bridge knots.

Bridge spectra of cables of 2-bridge knots. Ph.D. Thesis, 2016.

Self-intersecting polygons. Undergraduate senior thesis, Kutztown University of Pennsylvania, 2010.

Works in Progress

Random straight links. In preparation for submission with A. Tsvietkova.

Large volume links. In progress with J. Purcell.

Patterns in knot types. In progress with H. Chapman.

Snail links and fiberedness. In progress with M. Hirasawa.

Combinatorial neural codes of mouse visual cortical areas. In progress with T. Burns* and F. Castellano-Macías*.

* - student collaborators

CONFERENCE AND WORKSHOP ORGANIZATION

Computational Problems in Low-dimensional Topology II, Organizer

April 2019

Hosted at OIST. A small conference in computational topology. Organizers planned schedule, hosted invitees, and dealt with logistics.

- Geometry and Topology of 3-manifolds workshop*, Local Co-Organizer May 2018
 Hosted at OIST. The conference was supported by NSF and OIST funding. Planned schedule, hosted invitees, and dealt with logistics. Local co-organizers arranged accommodation, distribution of funds, and were the main contact point for participants of the conference.
- Computational Problems in Low-dimensional Topology I*, Organizer March 2018
 Hosted at OIST. A small conference in computational topology.
- MoSAIC Conference*, Local Organizer November 2015
 A moving conference with the goal of introducing students, faculty, and the public to the interactions between math and art.

TALKS

Invited Talks

- Applications and Computations in Knot Theory, Special Session, JMM**
Computation of tunnel numbers for low crossing knots January 2020
 Denver, USA.
- Groups-Semigroups-Topology Seminar**
Straight diagrams, snails, and random link January 2019
 University of Nebraska–Lincoln, USA.
- Knots in Washington XLVII**
Snail links and random straight links January 2019
 Washington D.C., USA.
- 2018 Ryukyu Knot Seminar**
Snail links and random straight links December 2018
 Naha, Japan.
- Topology Seminar**
Straight number and its relation to other invariants October 2018
 Osaka University, Osaka, Japan.
- Topology and Computer 2018**
Straight number and volume October 2018
 Nara Women’s University, Nara, Japan.
- Geometry and Topology Seminar**
Straight knots, volume and snails October 2018
 Hiroshima University, Hiroshima, Japan.
- Topology Seminar**
Straight Knots and Volume August 2018
 Monash University, Melbourne, Australia.
- Topology and Geometry Seminar**
Knots: From Application to Theory, Parts I - III November 2017
 Okinawa Institute of Science and Technology, Okinawa, Japan.
- Ursinus Math Seminar**
Make math better with 3D models and printing February 2017
 Ursinus College, Collegeville, PA.

Invited Talks, continued**Knots in Washington***Straight Knots - A new invariant*

December 2016

George Washington University, Washington, D.C.

AMS Fall Eastern Sectional*Bridge spectra of Cables of 2-bridge knots*

September 2016

Bowdoin College, Brunswick, ME

AMS Central Sectional*Recent results in bridge spectra.*

April 2016

North Dakota State University, Fargo, ND

Advances in Quantum and Low-Dimensional Topology 2016*3D printing for topology*

March 2016

University of Iowa, Iowa City, IA

Iowa Topology Seminar*Recent results concerning bridge spectra*

March 2016

University of Iowa, Iowa City, IA

Joint Mathematics Meetings*Gaps in bridge spectra*

January 2016

Seattle, Washington.

Knots in Washington*3-D printing and knot theory and Recent results concerning bridge spectra*

December 2015

George Washington University, Washington, D.C.

MoSAIC Conference*More about conic sections than you thought possible*

November 2015

University of Nebraska-Lincoln, Lincoln, NE

LSU Virtual Topology Seminar*Recent results concerning bridge spectra*

October 2015

Louisiana State University, Baton Rouge, LA

MathFest, MAA conference*Exploring Visualizations: An Overview of a Seminar in 3D Modeling and Printing* August 2015

Washington, D.C.

Thin Manifold Conference*Straight knots*

Summer 2014

University of Iowa, Iowa City, IA

Colloquium: A Mathematics Inquiry Learning at Kutztown - Undergraduate**Research Presentation Lecture***An Exordium of Self-Intersecting Polygons*

April 2011

Kutztown University of Pennsylvania, Kutztown, PA

MathFest, MAA conference*A preview of self-intersecting polygons*

August 2010

Pittsburgh, PA

Eastern Pennsylvania and Delaware Section of the MAA

A preview of self-intersecting polygons Spring 2010
 Elizabethtown College, Elizabethtown, PA

Moravian College Student Mathematics Conference

A preview of self-intersecting polygons Spring 2010
 Moravian College, Bethlehem, PA

Seminar and other talks

Topology and Geometry Research Seminar, OIST Spring 2018
Straight Knots questions

Northeastern High School Fall 2016
Types of space, Parts I and II

A talk aimed at high school students to build interest in math.

All Girls All Math Summer 2015

What is a knot and how to color one

A summer workshop in mathematics for high school girls at UNL.

UNL Groups-Semigroups-Topology Seminar

Bridge Spectra and Bridge Number, Parts I and II Spring 2015

Making Straight knots Fall 2014

(Almost) All the ways to color knots, Parts I and II Spring 2014

Self-intersecting Polygons Fall 2012

UNL Graduate Student Seminar

What everyone should know about Knot theory Spring 2014

UNL Mathematical Literature Seminar

Seifert's algorithm and flat genus Summer 2012

TEACHING EXPERIENCEVisiting Assistant Professor, Colby College

Calculus I Spring 2020

Two sections of Colby's standard two course calculus sequence.

Linear Algebra Spring 2020

One section of the introduction to linear algebra.

Calculus I Fall 2019

Two sections of Colby's standard two course calculus sequence.

Instructor, Okinawa Institute of Science and Technology

Math Neuroscience Spring 2019

A introduction to algebraic techniques used in Neuroscience, taught in IBL style.

Introduction to Proof Fall 2018

A course on the basics to proof, taught in IBL style.

Mentoring for graduate student rotation Summer 2018

Mentored a graduate student in Algebra and Combinatorics in the summer semester.

Independent Study, Algebraic Topology, part II Spring 2018
Co-taught an Independent study for graduate students in Algebraic Topology and Knot theory, part II

Independent Study, Algebraic Topology, part I Fall 2017
Co-taught an Independent study for graduate students in Algebraic Topology, part I

Visiting Assistant Professor, Gettysburg College

MATH 225: Differential Equations Spring 2017
One section of the standard Differential Equation class.

MATH 112: Calculus II Spring 2017
Two sections of the standard calculus class.

MATH 111: Calculus I Fall 2016
Three sections of the standard introduction to calculus class.

Sole Instructor, University of Nebraska-Lincoln

MATH 103: College Algebra and Trigonometry, Instructor Spring 2016 and Fall 2012
A 5 day a week course that is the combination of two separate courses.

MATH 106: Calculus I, Lecturer Fall 2015
A course in calculus, with multiple recitations run by teaching assistants.

MATH 300: Mathematics Matters, Instructor Fall 2014
An undergraduate course for pre-service elementary teachers

MATH 102: Trigonometry, Course convener and instructor Fall 2013 and Spring 2013
As convener in Spring 2013, responsibilities included writing the common syllabus, exams, finals, and coordinating the other instructors of the course.

Teaching Assistant

IMMERSE, Bridge program to graduate school Summer 2015
Assisted pre-graduate students in the algebra portion of this program, which included helping with small-group work, writing exercises, grading, and guiding students through a technical research paper.

NebraskaMATH Summer 2012, 2013, 2014
NebraskaMATH is an NSF funded program that has a main goal of improving student achievement in mathematics by deepening the understanding of mathematics for teachers in primary, middle, and secondary education.

Calculus I and II, Recitation Instructor Fall 2011, Spring 2012, and Summer 2013

Other Teaching Experience

3D Modeling and Printing Workshop, Creator and Organizer Fall 2014 - Fall 2015
A workshop that I designed and taught with the goal to introduce undergraduates, graduate students, and faculty to 3D modeling and printing, with an emphasis of how it relates to math, visualizations of mathematical concepts, and how 3D printing to assist us in the classroom.

- Topology Qualifying Exam Workshop, Organizer* Summer 2014
I organized, designed, and ran a two-week workshop to prepare graduate students taking the Ph.D qualifying exam in topology
- Undergraduate Mentor* Fall 2013 - Spring 2015
Assisted in mentoring an undergraduate student in her project to create a mural of mathematics in the undergraduate math lounge.
- Actively Learning Mathematics Research Action Cluster* Fall 2014
Mentored three younger graduate students who were teaching for the first time.
- Mathematics Resource Center, Counselor* 2011 - 2016
Graduate students work as counselors for students seeking help with math.

SERVICE

- MRC Reorganization Committee, Member* Spring 2016
The Math Resource Center is UNL's free department run math help center. The committee was formed to evaluate its strengths and weaknesses and supply recommendations to the department on how to improve the quality of center.
- Graduate Student Advisory Board, Member* 2014 - 2016
A committee of math graduate students who act as a liaison between the department and the graduate student body.
- Groups-Semigroups-Topology Seminar, Organizer* 2015 -16 Academic Year
- Math Day Volunteer, Bowl Moderator* 2011 - 2015
A math competition held by UNL for high school students.
- Job Search for Dean of College of Arts and Sciences, Student Representative* Fall 2014
- Committee for selecting new trigonometry book, member* Spring 2013
- Mathematics Stack Exchange, member* Fall 2013 - present
Reputation: 4,250, as of May, 2018, in the top 8% of all users.

PROFESSIONAL DEVELOPMENT

- Foundation of Teaching and Pedagogy, Participant* OIST, Spring 2018
Workshop to enhance your knowledge of best practices in evidence-based teaching and pedagogy and help understand how to use "active learning" to promote student learning.
- Preparing Future Faculty, Participant* UNL and Nebraska Wesleyan, Summer, Fall 2015
A course for graduate students who plan to pursue a career in academia. The focus is on developing job search materials and to act as a guide for succeeding as a new faculty member.
- Job Search Seminar, Attendee* UNL, Fall 2015
A seminar for graduate students in math who plan on applying in the next two years. Ran by the department chair, we discuss the job search process and review materials we plan to submit.
- Professional Development Seminar, Attendee* UNL, Fall 2014
A seminar that primarily was composed of panels on different topics that will help students succeed after graduate school.

PROFESSIONAL ORGANIZATIONS

<i>American Mathematical Society</i> , Member	2011 - present
<i>Mathematical Associate of America</i> , Member	2015 - present
<i>Association for Women in Mathematics</i> , Member	2015 - present

COMPUTER SKILLS

Websites

nick.owad.org
knot.ninja

Programing Languages known

Proficient: Python, Javascript
Moderate knowledge: SQL, Slurm, C++, HTML

Mathematics application

Proficient: Snappy
Moderate knowledge: Mathematica, Sage, Maple, Regina

3D Modeling and Printing Software

Highly Proficient: Rhinoceros 3D, Slic3r, XYZware, Cura
Moderate knowledge: Blender, OpenSCAD, OpenJScad