

Nicholas A. Scoville

Curriculum Vitae

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Ursinus College
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POSITIONS HELD

Ursinus College

Joseph Beardwood III Chair of Mathematics	Fall 2017-Fall 2022
Associate Professor	2016-present
Chair of Mathematics and Computer Science	2016-present
Assistant Professor	2010-2016

Faulkner University

Adjunct Professor	2015
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EDUCATION

Dartmouth College

Ph.D., Mathematics	June 2010
Masters of Arts, Mathematics	June 2007

Western Michigan University

Masters of Science, Mathematics	June 2005
Bachelors of Science, Mathematics	August 2003

Grand Rapids Community College

Associates, Architectural Drafting	May 2001
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TEACHING EXPERIENCE

Ursinus College,

Math 335: Abstract Algebra
Math 491: Algebraic Topology
Math 451: Discrete Morse Theory
Math 361: Graph Theory
CIE 100: Common Intellectual Experience
Math 421: Topology
Math 235: Linear Algebra
Math 10: Problem Solving
Math 322: Geometry
Math 341: Probability
Math 236W: Discrete Mathematics
Stat 141Q: Statistics I
Math 112: Calculus II

Adjunct Professor, Faulkner University*Math 1312: Mathematics*

Spring 2015

Other teaching experience,*Teaching Assistant: Dartmouth College*

Summer 2009

Instructor: Dartmouth College

2007-2009

Teaching Assistant: Dartmouth College

2005-2007

Instructor: Western Michigan University

2003-2005

Undergraduate Teaching Assistant: Western Michigan University

2002-2003

INDEPENDENT STUDIES

Ursinus College,

Persistent homology, Ryan Quick

fall 2018

Algebraic topology, Jason Bennett

fall 2018

Generating Discrete Morse Functions from Point Data, Ashlyn Welch

spring 2018

Random discrete Morse theory, Nikolai Peralta

spring 2018

Homotopy theory, Karthik Yegnesh

Fall 2016 spring 2017, fall 2017, spring 2018

Topology, Ian Rand

Spring 2017

Discrete Morse theory and Persistent homology, Yuqing Liu

Spring 2017

Random discrete Morse theory, , Nikolai Peralta, Chase Babrich

Fall 2016, spring 2017

Algebraic topology, Matan Peleg

Fall 2016, spring 2017

Category theory, Michael Vennettilli

Spring 2015

Multiplication in discrete Morse theory, Rose Blanchard

Spring 2015

Number theoretic notions in discrete Morse theory, Ian Rand

Spring 2015

Discrete Morse theory, Tyler Helms

Fall 2014

Estimating the discrete LS category, Brian Green

Fall 2013

Homology and Cohomology, Seth Aaronson, Brian Green, Michelle Tanco

Spring 2013

Discrete LS category, Seth Aaronson

Spring 2013

Counting discrete Morse functions, Seth Aaronson

Spring 2012

Lie Groups, Brian Green

Spring 2012

Discrete Morse Theory, Mike Agiorgousis

Spring 2012

Markov Chains, Jayant Velagala

Spring 2012

Probability, Jayant Velagala

Fall 2011

Knot Theory, Will Molden

Fall 2011

Discrete Morse Theory, Seth Aaronson

Spring 2011

STUDENT POSTERS

Karthik Yegnesh *Families of Objects in Categories and Elementary Topoi,*

AMS/MAA Joint Math Meetings, Atlanta, Georgia

January 2017

Karthik Yegnesh *Cosheaf theoretical constructions in networks and persistent homology,*68th annual Delaware Valley Science Fair, Oaks, Pennsylvania (won “first place” in Mathematics)

March 2016

Karthik Yegnesh *Cosheaf theoretical constructions in networks and persistent homology,*59th annual Montgomery County Science Research Competition, Collegeville, Pennsylvania
(won “first place” in math category)

March 2016

- Matt Belle *Arboricity*,
AMS/MAA Joint Math Meetings, Baltimore, Maryland January 2014
- Brian Green *Estimating the discrete Lusternik–Schnirelmann category*,
AMS/MAA Joint Math Meetings, Baltimore, Maryland January 2014
- Seth Aaronson *Lusternik–Schnirelmann category for cell complexes*,
AMS/MAA Joint Math Meetings, San Diego, California January 2013
- Mike Agiorgousis, Brian Green, and Alex Onderdonk *Discrete Morse Functions and Homology*,
AMS/MAA Joint Math Meetings, San Diego, California (won “Outstanding Presentation” award) January 2013
- Mike Agiorgousis, Brian Green, and Alex Onderdonk *Discrete Morse Functions and Homology*,
Undergraduate Science Research Symposium, Haverford College September 2012
- Mike Agiorgousis, Brian Green, Alex Onderdonk, and Kim Rich *Discrete Morse Functions and Homology*,
Disappearing Boundaries Summer Research Meeting, Lebanon Valley College July 2012
- Seth Aaronson and Marie Meyer, “*Graph Isomorphisms in Discrete Morse Theory*”, *AMS/MAA Joint Meetings*,
Boston, MA January 2012

PUBLICATIONS

- Colin Adams, Allison Henrich, Kate Kearney and Nicholas A. Scoville, “Knots Related by Knotoids,” *American Mathematical Monthly* (to appear)
- Dominic Klyve and Nicholas A. Scoville, “Summation graphs and discrete Morse theory,” *submitted*
- Nicholas A. Scoville, “Connecting Connectedness: A Mini-Primary Source Project for Topology Students,” *Convergence* (October 2017)
- D. Fernandez-Ternero, E. Macias-Virgos, N. A. Scoville, and J. A. Vilches, “Strong discrete Morse theory and simplicial LusternikSchnirelmann category: A discrete version of the Lusternik-Schnirelmann Theorem,” *submitted*
- Erick Chastain and Nicholas A. Scoville, “Homology of Boolean functions and the complexity of simplicial homology,”
- Mike Agiorgousis, Brian Green, Alex Onderdonk, Nicholas A. Scoville, and Kim Rich, “Homological sequences in discrete Morse theory,” *submitted*
- Nicholas A. Scoville and Karthik Yegnesh “A Persistent Homological Analysis of Network Data Flow Malfunctions,” *Journal of Complex Networks*, Issue 6, 1 December 2017, Pages 884-892
- Nicholas A. Scoville and Willie Swei “On the Lusternik–Schnirelmann category of a simplicial map,” *Topology and its applications* 216 (2017), 116-128
- Brian Green, Nicholas A. Scoville, and Mimi Tsuruga, “Estimating the discrete Lusternik–Schnirelmann category,” *Topological Methods in Nonlinear Analysis*, 45, No. 1 (2015), 103–116

Akshaye Dhawan, Michelle Tanco, and Nicholas A. Scoville, “A Distributed Greedy Algorithm for Constructing Connected Dominating Sets in Wireless Sensor Networks,” *SENSORNETS*, Lisbon, Portugal January 2014

Nicholas A. Scoville, “Metric Structures for CW Complexes,” *Topology Proceedings*, 44 (2014) 117–131

Seth Aaronson, Marie Meyer, Nicholas A. Scoville, Mitchell T. Smith, and Laura Stibich, “Graph Isomorphisms in discrete Morse theory,” *AKCE Int. J. Graphs Comb.*, 11, No. 2 (2014), 163–176

Seth Aaronson and Nicholas A. Scoville, “Lusternik–Schnirelmann category for cell complexes,” *Illinois J. of Mathematics*, 57, No. 3 (2013), 743–753

Nicholas A. Scoville, “Georg Cantor at the Dawn of Point-Set Topology,” *Loci*, (March 2012), DOI: 10.4169/loci003861

Nicholas A. Scoville, “Lusternik–Schnirelmann Category and the Connectivity of X ,” *Algebraic & Geometric Topology*, 12 (2012) 435–448

Nicholas A. Scoville, “Mapping Cone Sequences and a Generalized Notion of Cone Length,” *JP Journal of Geo. and Top.*, 11(2011), Issue 3, 209–233

Nicholas A. Scoville, “A Metric for Homotopy Types,” Ph.D. Thesis, Dartmouth College, Spring 2010

Rob Nendorf, Nicholas A. Scoville, Jeff Strom, “Categorical Sequences,” *Algebraic & Geometric Topology*, 6 (2006) 809–838

SELECTED PRESENTATIONS

<i>Digital Topology: A smooth introduction</i> Western Michigan University (invited talk)	October, 2018
<i>Strong discrete Morse theory</i> ICART 2018, Rabat Morocco	July, 2018
<i>Digital Topology: A smooth introduction</i> Colloquium, Elon University (invited talk)	March, 2018
S^1 and S^2 and S^3 , oh fy! A digital Hopf fibration Math Colloquium, Montana State University (invited talk)	January, 2018
S^1 and S^2 and S^3 , oh fy! A digital Hopf fibration Colloquium, Catholic University of America (invited talk)	November, 2017
<i>Digital Topology: A smooth introduction</i> Colloquium, Bard College (invited talk)	November, 2017
S^1 and S^2 and S^3 , oh fy! A digital Hopf fibration	November, 2017

- Colloquium, Dartmouth College (invited talk)
- Digital Topology: A smooth introduction* October, 2017
Colloquium, Seattle University (invited talk)
- Digital Topology: A smooth introduction* October, 2017
Colloquium, Central Washington University (invited talk)
- Simplicial Lusternik–Schnirelmann category and strong discrete Morse theory* October, 2017
Topology Seminar, University of Florida (invited talk)
- S^1 and S^2 and S^3 , oh fy! *A digital Hopf fibration* October, 2017
Colloquium, University of Florida Colloquium (invited talk)
- Digital Topology: A smooth introduction* September, 2017
Math Club, Cleveland State University (invited talk)
- A Persistent Homological Analysis of Network Data Flow Malfunctions* August, 2017
Applied Algebraic Topology in Sapporo, Sapporo Japan
- A Persistent Homological Analysis of Network Data Flow Malfunctions* June, 2017
Applied Topology in Bedlewo, Bedlwo Poland
- A Simplicial Lusternik–Schnirelmann Theorem (poster)* June, 2017
Topological Data Analysis: Theory and Applications, Macalester College
- Towards a new digital homotopy theory* April 2017
Colloquium, Cleveland State University (invited talk)
- Collaborative Research: Transforming Instruction in Undergraduate Mathematics via Primary Historical (TRIUMPHS)* January, 2017
MAA Invited Paper Session on Research in Improving Undergraduate Mathematical Sciences Education Program, AMS/MAA Joint Meetings, Atlanta (invited talk)
- (Strong) discrete Morse theory as an introduction to topology* September, 2016
Colloquium, Butler University (invited talk)
- Georg Cantor at the dawn of point-set topology* September, 2016
Butler University (invited talk)
- A Simplicial Lusternik–Schnirelmann Theorem (poster)* July, 2016
ATMCS 7, Torino Italy
- The Cantor Set before Cantor* January, 2016
AMS/MAA Joint Meetings, Seattle Washington
- Discrete Morse theory as an introduction to Topology* December 2015
Colloquium, University of Sevilla (invited talk)
- Graph isomorphisms in discrete Morse theory* October, 2015
Colloquium, Lehigh University (invited talk)
- Estimating the discrete Lusternik–Schnirelmann category* February, 2015
Homology: Theoretical and Computational Aspects, Genoa, Italy
- Discrete Morse theory at the service of Number Theory* January, 2015
MAA General Contributed Paper Session on Research in Topology, AMS/MAA Joint Meetings, San Antonio

- Graph isomorphisms in discrete Morse theory* October, 2014
Colloquium, Seattle University (invited talk)
- Lusternik–Schnirelamnn category, categorical sequences, and rational numbers* September, 2014
Topology seminar, University of Michigan (invited talk)
- Topology and its history- must there be a separation?* May, 2014
Pohle Colloquium, Adelphi University (invited talk)
- Lusternik–Schnirelamnn category, categorical sequences, and rational numbers* February, 2014
Geometry/Topology seminar, University of Pennsylvania (invited talk)
- Topology and its history- must there be a separation?* January, 2014
PASHoM Seminar, Villanova University (invited talk)
- Graph isomorphisms via discrete Morse theory* January, 2014
AMS Special Session on Trends in Graph Theory, AMS/MAA Joint Meetings, Baltimore
- Topology and its history are connected under the classroom topology* October, 2013
Special Session on History of Mathematics and Its Use in Teaching,
AMS Southeastern Sectional meeting, University of Louisville (invited talk)
- Computing the Discrete Lusternik–Schnirelmann category of a simplicial complex* July, 2013
Applied Topology in Bedlewo, Bedlewo, Poland
- Discrete Lusternik–Schnirelmann category* October, 2012
General Contributed Paper Session, AMS Southeastern Sectional Meeting, Tulane University
- Discrete Morse theory and the homology of simplicial complexes* August, 2012
General Contributed Paper Session, Mathfest, Madison
- Fun with Pi* March, 2012
Pi Day Celebration, Ursinus College
- Lusternik–Schnirelmann Category and the Connectivity of X* January, 2012
Research in Algebra and Topology, AMS/MAA Joint Meetings, Boston
- Graph Isomorphisms in Discrete Morse Theory* November, 2011
Colloquium, Saint Joseph’s University (invited talk)
- Graph Isomorphisms in Discrete Morse Theory* October, 2011
Colloquium, Swarthmore College(invited talk)
- Graph Isomorphisms in Discrete Morse Theory* September, 2011
Colloquium, Gettysburg College (invited talk)
- Discrete Morse Functions on Graphs* August, 2011
Pure Mathematics Session, Mathfest, Lexington
- The Advent of Point-Set Topology* January, 2011
General Topology Session, AMS/MAA Joint Meetings, New Orleans
- Pick’s Theorem: How to compute the area of a polygon* October, 2010
 ϵ -talk Seminar, Ursinus College
- Rethinking the way we teach Point-Set Topology* August 2010
The History of Mathematics and Its Uses in the Classroom, Mathfest, Pittsburgh

<i>Irrational Numbers</i> Colloquium, St. Mary's University (invited talk)	February 2010
<i>2 Equations Attributed to Euler</i> Colloquium, Mount Saint Mary's College (invited talk)	February 2010
<i>What makes Topological Spaces different?</i> Colloquium, Ursinus College (invited talk)	January 2010
<i>A Metric for Homotopy Types</i> Geometry/Topology Session III, AMS/MAA Joint Meetings, San Francisco	January 2010
<i>Generalized Cone and Killing Lengths</i> Graduate Student Seminar, Dartmouth College	November 2008
<i>Hopf Invariants and the Reduced Diagonal</i> Topology Seminar, Western Michigan University	April 2004
<i>Something About the Quartic</i> History of Math Seminar, Western Michigan University	February 2004
<i>Diophantine Equations</i> Student Seminar, Western Michigan University	February 2004
<i>Beginning Invariant Theory and the Fundamental Theorem of Symmetric Polynomials</i> Algebra Seminar, Western Michigan University	January 2004
<i>Two Special Cases of Ganea's Conjecture</i> Topology Seminar, Western Michigan University	December 2003

WORKSHOPS RUN

<i>TRIUMPHS Training Workshop</i> University of Colorado Denver	September 13-15, 2018
<i>Teaching Undergraduate Mathematics via Primary Source Projects</i> AMS/MAA Joint Math Meetings, San Diego CA	January 2018
<i>Teaching Mathematics with Primary Historical Sources</i> MAA EPADEL sectional meeting, Kutztown PA	April 1, 2017
<i>TRIUMPHS Training Workshop</i> University of Colorado Denver	September 8-10, 2016
<i>Connecting Past to Present: An approach to teaching topology via original resources</i> HPM 2016, Montpellier France	July, 2016

PROFESSIONAL AFFILIATIONS

<i>Council on Undergraduate Research</i>	2013-2017
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<i>History of Mathematics Special Interest Group of the Mathematical Association of America (HOMSIGMAA)</i>	2012-Present
<i>Association of Christians in the Mathematical Sciences</i>	2011-Present
<i>Mathematical Association of America</i>	2009-Present
<i>American Mathematical Society</i>	2005-Present
<i>Pi Mu Epsilon Mathematics Honors Society</i>	Fall 2002-Spring 2005

HONORS AND AWARDS

Ursinus College

Western Michigan University Department of Mathematic Alumni Achievement Award
October, 2015

**Collaborative Research: RUI: Transforming Instruction
in Undergraduate Mathematics via Primary History Sources**

NSF IUSE (Aug. 2015- Sept. 2020) PIs at Colorado State, Central Washington,
NMSU, Xavier, U Colorado, Denver, U Florida \$71,002

Best oral presentation at HTCA conference in Genoa, Italy
sponsored by Gruppo Italiano Ricercatori in Pattern Recognition. February 2015

Mellon travel grant July 2013

Mellon travel grant May 2012

Project NExT Fellow Aug. 2010 – Aug. 2011

Dartmouth College

GAANN Fellowship Sept. 2009 – Sept. 2010

Dartmouth College Graduate Fellowship 2005– 2010

ADDITIONAL SKILLS

Mathematical Software: LATEX, MATLAB, Maple, BlackBoard, WeBWork, HTML, Minitab, Derive, Java.

MATHEMATICAL ACTIVITIES

Member of NSF's College of Reviewers for Undergraduate Education 2018-2021

Scientific Committee, ESU8, Oslo Norway July 2018

Scientific Committee, ICART 2018, Rabat Morocco July 2018

Organized Special Session “AMS Special Session on Open & Accessible Problems for Undergraduate Research, ” with Allison Henrich and Michael Dorff at AMS/MAA Joint Math Meetings	January 2018
Focus Magazine, editorial board	November 2017-present
Served on NSF panel review	2016, 2017, 2018
Served on MAA Basic Library List Committee	January 2017-present
Organized Special Session “AMS Special Session on Open & Accessible Problems for Undergraduate Research, ” with Allison Henrich and Michael Dorff at AMS/MAA Joint Math Meetings	January 2017
Served on panel “The Research and Teaching Pendulum: January 2017 Finding a Stable Equilibrium” at AMS/MAA Joint Math Meetings	January 2017
Organized Special Session “Applied and Computational Topology, ” with Matthew Wright and Paweł Dłotko at AMS/MAA Joint Math Meetings	January 2016
Organized panel “Finding a thesis topic and advisor, ” at AMS/MAA Joint Math Meetings	January 2016
Reviewed applications for Posters on the Hill	Fall 2015
Reviewer for MathSciNet Mathematical Reviews	February 2015-present
Organized panel “Graduate school: Choosing one, getting in, staying in, ” at AMS/MAA Joint Math Meetings	January 2015
Reviewed applications for Posters on the Hill	Fall 2014
Book reviewer for online MAA book reviews	2014-Present
Faculty representative for Ursinus MAA student chapter	2014-Present
CUR Councilor in the Mathematics and Computer Sciences Division	2014-Present
Served on panel “You published your dissertation: now what?” at AMS/MAA Joint Math Meetings	January 2013

Organized panel “The on-campus interview survival guide” at AMS/MAA Joint Math Meetings	January 2013
Reviewer for mathematical publication database Zentralblatt	August 2012-present
Senior Personal, Ursinus College REU (NSF Grant No. DMS-1003972)	June 2012-August 2012
Organized Panel “Hit the Ground Running! Interview like a Pro and land the job” at AMS/MAA Joint Math Meetings	January 2012
Senior Personal, Ursinus College REU (NSF Grant No. DMS-1003972)	June 2011-August 2011
Judge for MAA Student Paper Session 3, MathFest	August 2011
Judge of research abstracts for Young Mathematicians Network Conference applicants	July 2011
Judge for MAA Student Poster Session, Joint Mathematics Meetings	January 2011
Calculus Committee, Ursinus College; Member	August 2010-present
Statistics Committee, Ursinus College; Member	August 2010-present
Organizer for Ursinus College ϵ -talks	Fall 2010-present
Treasurer for YMN (Young Mathematicians Network)	2010-present
Judge for MAA Student Paper Session 11, MathFest	August 2010
Reader/Reviwer for “Introduction to Homotopy Theory” by Martin Arkowitz	2007-2008
Student Seminar Organizer	2004-2005
WMU Pi Mu Epsilon Graduate Representative	2003-2005
Grader	Summer 2004, Summer 2003

ADDITIONAL ACTIVITIES

- Second Grade PREP Teacher** Fall 2016-current
 Taught hour-long once weekly religious formation/catechism class to second grade students at Sacred Heart Parish, Royersford PA.
- First Grade PREP Teacher** Fall 2015-Spring 2016
 Taught hour-long once weekly religious formation/catechism class to first grade students at Sacred Heart Parish, Royersford PA.
- Fourth Grade PREP Teacher** Fall 2014-Spring 2015
 Taught hour-long once weekly religious formation/catechism class to fourth grade students at Sacred Heart Parish, Royersford PA.
- Ursinus College Newman Society Faculty Advisor** Fall 2011-present
- Sixth Grade PREP Teacher** Fall 2011-Spring 2014
 Taught hour-long once weekly religious formation/catechism class to sixth grade students at Sacred Heart Parish, Royersford PA.
- Beat *Silver Surfer*** September 2011
 Finished NES game *Silver Surfer* (Arcadia Systems, 1990), considered by many to be the most difficult game in NES history.
- Sixth Grade Religious Education Teacher** Fall 2010-Spring 2011
 Taught hour-long once weekly religious formation/catechism class to sixth grade students at St. Norbert Parish, Paoli PA.
- Seventh Grade Religious Education Teacher** Fall 2009-Spring 2010
 Taught hour-long once weekly religious formation/catechism class to seventh grade students at St. Denis Parish, Hanover NH.
- Contra Speedrun** Fall 2008
 Defeated NES video game Contra in 11 minutes and 4 seconds without cheats or turbos, Hanover NH
- Youth Group Leader at St. Denis Parish** Fall 2008-Spring 2009
 Gave lectures, organized activities, participated in service projects

REFERENCES

Martin Arkowitz (advisor)
 6188 Kemeny Hall
 Dartmouth College Mathematics Dept.
 Hanover, NH 03755
 Martin.A.Arkowitz@dartmouth.edu

Jeff Strom
 Department of Mathematics
 Western Michigan University
 Kalamazoo MI 49008-5248
 jeff.strom@wmich.edu

Dorothy I. Wallace (teaching letter)
 6188 Kemeny Hall
 Dartmouth College Mathematics Dept.
 Hanover, NH 03755
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