# Neil R. Nicholson, Ph.D.

North Central College

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## Positions Held

Associate Professor of Mathematics, North Central College, 2016-

Assistant Professor of Mathematics, North Central College, 2010-2016

Assistant Professor of Mathematics, William Jewell College, 2007-2010

Adjunct Instructor, Maple Woods Community College, 2008-2009

Algorithm Development Contractor, Houghton Mifflin Company, 2007

Presidential Fellow, The University of Iowa, 2002-2007

Instructor, Kirkwood Community College, 2004-2005

## Education

Ph.D., Mathematics, The University of Iowa, May 2007
> Dissertation: On Knots and Their Invariants
> Advisor: Dr. Richard Randell

B.A., Mathematics, Computer Science minor, Summa cum Laude, Phi Beta Kappa, Lake Forest
> College, 2002

Additional
> Institute for Mathematics and Its Applications Summer Program in Topology and its
> Applications, Mississippi State University, 2006
> American College of Sports Medicine Continuing Education, Road Runners Club of
> America Coaching Certification, 16 credit hours, 2014

## Research Interests

- o Primary: topology, specifically knot theory and the relationships between knot invariants and knot polynomials, the space of piecewise linear knots, and knots and links in projective space (AMS Subject Classifications 57M27, 57M25, 57M15)
- o Secondary: knot theory and algorithmic music writing, graph theory, discrete and computational geometry with combinatorics, math modeling education

Research with Undergraduates:

*Cops and robbers on toroidal chess graphs* with Allyson Hahn, North Central College, 2018 (presentations at Nebraska Conference for Undergraduate Women in Mathematics, January 2019, Rall Symposium, May 2019, paper submitted/preprint available at https://arxiv.org/pdf/1810.10577.pdf)

*Visibility preserving functions* with Jack Billings, North Central College, 2017 (paper: Minnesota Journal of Undergraduate Mathematics (Volume 4), presented at Rall Symposium May 2016, MAA MathFest May 2016, Joint Mathematics Meetings 2018)

*Patterns in the weak visibility of lattice points* with Jack Billings, North Central College, 2015 (presented at Joint Mathematics Meetings MAA Poster Session, Seattle, 2016)

*Piecewise-linear pseudodiagrams* with Molly Durava, Kelleigh Kuehl, and Jackson Ramsey, North Central College, 2014

*Weakly viewing lattice points* with Rebecca Rachan, North Central College, 2014 (paper to appear; presented at Joint Mathematics Meetings MAA Poster Session (Top 3 award), San Antonio, 2015)

*Determining piecewise-linear pseudoknots* with Molly Durava and Jackson Ramsey, North Central College, 2013 (paper in preparation; preprint available at http://arxiv.org/abs/1308.6776; presented at National Council of Undergraduate Research (Durava), The University of Kentucky, April 2014, Rall Symposium (Durava) May 2014)

*Weakly viewing triangles* with Christopher Halverson and Jackson Ramsey, North Central College, 2012

*Tiling* with Tyler Schroeder, North Central College, 2012 (presented at Joint Mathematics Meetings 2013, National Council of Undergraduate Research, University of Wisconsin-La Crosse, April 2013)

*Mathematics of the Rubik's Cube* with Kacy Kane and Julien Milcent, North Central College, 2012

*Resolutions and Bridge Number* with Donglun Liu, Steven Mackey, Tyler Schroeder, and Kyle Thomas, North Central College, 2011 (Pi Mu Epsilon Prime Time Colloquium Spring 2011, Rall Symposium (Schroeder) May 2012), Journal of Knot Theory and its Ramifications, 22(10): 8 pp., 2013.

*Weakly viewing lattice points* with Christopher Sharp, William Jewell College, 2008, Involve: A Journal of Mathematics, 3(1), 9—16, 2010.

*Age, gender, and knot tying* with Elizabeth Waterland, William Jewell College, 2008-2009

*Universe resolutions and bridge number* with Jacob Dunham, Illinois Wesleyan University, 2008

*Dissecting link invariants* with Jerrad Hansen, William Jewell College, 2008


## Teaching Experience
### North Central College
Courses Taught:
> Finite Mathematics; First Year Experience, Integrated Calculus I – Calculus of Limits; Integrated Calculus II – Calculus of Derivatives; Calculus I; Calculus II, Calculus III, Calculus IV, Nature of Proof in Mathematics, Linear Algebra, Problem Solving Seminar, Topology, Senior Seminar, Interdisciplinary Studies: The Ethics of Statistical Manipulation, Interdisciplinary Studies: Real World Problems and Math Modeling Solutions

Courses Designed and Taught:
> Seminar on Leadership Theory: The Ethics of Statistical Manipulation, 2013
> Interdisciplinary Studies: Real World Problems and Math Modeling Solutions, 2017


### William Jewell College:
Courses Taught:
> Abstract Algebra; Advanced Mathematics Seminar: The Art of Problem Solving I and II; Applied Calculus and Statistics; Applied Linear Algebra; Calculus II; Calculus III; Math Model Building and Statistics

Courses Designed and Taught:
> History of Mathematics (New course), 2009
> Mathematical Theoretical Development (Independent Study), 2009
> The Art of Problem Solving, 2008
> 12 Great Theorems (Independent Study), 2008
> Statistics and Advanced Inferences (Independent Study), 2008

## Publications

*Cops and Robbers on Toroidal Chess Graphs*, with Allyson Hahn, submitted; preprint available at
    https://arxiv.org/pdf/1810.10577.pdf.

*A Transition to Proof: An Introduction to Advanced Mathematics*, April 2019, CRC Press. 450 pp.

*Weak visibility preserving functions*, with Jack Billings, Minnesota Journal of Undergraduate
    Mathematics, 4, 1—6, 2019.

*From Sea to Shining Sea: Looking ahead with the National Park Service*, Moody's Mega Math Challenge
    2017 Challenge problem

*Visualizing Euclidean Rhythms using Tangle Theory*, with Jonathon Kirk, Polymath: An Interdisciplinary
    Arts & Sciences Journal, 6(1): 10 pp., 2016.

Review of *The Two-Wheeled World of George B. Thayer* by K. J. Hayes, *Journal of Sport History*, 43(2),
    2016

*On weak lattice point visibility*, with Rebecca Rachan, Involve: A Journal of Mathematics, 9(3), 411—
    414, 2016.

*Average bridge number of shadow resolutions,* with Donglun Liu, Steven Mackey, Tyler Schroeder, and
    Kyle Thomas, Journal of Knot Theory and its Ramifications, 22(10): 8 pp., 2013.

*Lasting Learning: Measuring impact and success through sustainability*, with Mary Embry and Deborah
    Scarfino, in Service-Learning in Higher Education: Connecting the Global to the Local, eds.
    Phylis Lan Lin and Mark R. Wiegand. Indianapolis: University of Indianapolis Press, 2013.
    29—43.

*Piecewise-linear virtual knots*, Journal of Knot Theory and its Ramifications, 20(9):1271—1284, 2011.

*Weakly viewing lattice points*, with Christopher Sharp, Involve: A Journal of Mathematics, 3(1):9—16,
    2010.

*Nonalternating knots and Jones polynomials*, Journal of Knot Theory and its Ramifications, 17(8):983—
    1003, 2008.

*On Knots and Their Invariants*, Ph.D. dissertation, The University of Iowa, Iowa City, IA, 2007

*Piecewise-linear pseudoknots*, with Molly Durava and Jackson Ramsey,
    http://arxiv.org/abs/1308.6776)

## Grants

North Central College FDRC Research & Writing Grant, $750, *Project Development/Grant Writing:
    NCAA Innovations in Research and Practice*

North Central College FPDC Research & Writing Grant, $2625, *Proofs Textbook, Continued,* 2016

North Central College FPDC General Education Curriculum Grant, $750, *Instructional Development:
    IDS 125 (Real World Problems and Math Modeling Solutions)*, 2016

North Central College FPDC Research & Writing Grant, $3000, *Proofs Textbook: First Steps*, 2015

Mathematical Association of America Dolciani Mathematics Enrichment Grant, $3400, *$E^2$
    (Expository Engagement): North Central Math Circle*, 2015

Mathematical Association of America Dolciani Mathematics Enrichment Grant, $5300, *$E^2$
    (Expository Engagement): North Central Math Circle*, 2014

Enactus Sam's Club Step Up for Small Business Challenge, $1500 Grant, *Delicious Empowerment:
    Arbor Vitae,* 2014

Gael D. Swing Fund for Creativity Grant, $1000, *Athletics Entrepreneurship Panel*, North Central
    College, 2013

Enactus Walmart Women's Economic Empowerment Project Partnership, $1500 Grant, *Hopi
    Enetrepreneurs*, 2013

Coca-Cola Uncap Opportunities for Women, $1500 Grant, *Hopi Entrepreneurs*, 2013

Mathematical Association of America Dolciani Mathematics Enrichment Grant, $6000, *$E^2$
    (Expository Engagement): North Central Math Circle*, 2013

North Central College FPDC Research & Writing Grant, $2775, *Invariants of Classical and Virtual Pseudoknots*, 2013

Enactus Lowe's Community Improvement Partnership Project, $2000 Grant, *Ann Reid Learning Gardens,* Co-Faculty Sponsor, North Central College, 2013

North Central College FPDC Research & Writing Grant, $2250, *External Grant Proposal Preparation*, 2012

North Central College FPDC Research & Writing Grant, $3000, *Enhancement of Maple Modules for the Integrated Calculus Sequence*, 2011

SIFE Sam's Club Challenge, $1000, *Environmental Impact Assessments*, Faculty Sponsor, North Central College, 2011

SIFE Sam's Club Challenge, $1000, *Marriot Hotel and City of Gladstone Improvements*, Faculty Sponsor, William Jewell College, 2010

Hall Family Foundation Collaborative Learning Grant, $1200, William Jewell College, 2009

Summer Research Grant, $1000, William Jewell College, 2008

## Selected Presentations

*Weak Visibility Preserving Functions*
  with Jack Billings, MAA General Contributed Paper Session on Number Theory, Joint Mathematics Meetings, San Diego, January 2018

*More or Less?*
  Waubonsee Community College Math Circle, Waubonsee Community College, March 2016
  Waubonsee Community College Math Circle, Waubonsee Community College, March 2015

*Counting and Cardinality*
  $E^2$: North Central Math Circle, North Central College, January 2015

*Euclidean Rhythms and Tangles*
  with Jonathon Kirk, MAA Special Session, "At the Intersection of Mathematics and the Arts," Joint Mathematics Meetings, Baltimore, January 2014

*Knotty or Nice?*
  $E^2$: North Central Math Circle, North Central College, November 2013

*Photographing Points*
  Illinois Section of the MAA Spring Meeting, Roosevelt University, April 2013

*The Mathematics of Knots*
  A Promising Start: Excellence In Scholarship Mini-Conference, North Central College, September 2012

*Winning…*
  Pi Mu Epsilon Prime Time Colloquium, North Central College, February 2012

*Lasting Learning: Measuring impact and success through sustainability*
  Fourth International Symposium on Service-Learning, Ningbo, Zhejiang, China, September 2011, with Mary Embry and Deborah Scarfino

*Linear Algebra Games: Merlin*
  Illinois Section of the MAA Spring Meeting, North Central College, April 2011

*Chess, Church, and Knots: Statistics Through Service and Research*
  MAA General Contributed Papers Session, Joint Mathematics Meetings, San Francisco, January 2010

*Nonalternating Knots and the Jones Polynomial*
  Invited Special Session, Joint Mathematics Meetings, New Orleans, January 2007

## Conferences Attended (recent)

Faculty Athletics Representatives Association Annual Meeting, Atlanta, November 2017
Faculty Athletics Representatives Association Annual Meeting, Indianapolis, November 2016
Illinois Section of the MAA Spring Meeting, Illinois College, April 2016
Illinois Section of the MAA Spring Meeting, Southern Illinois University, March 2014
Joint Mathematics Meetings, Baltimore, January 2014
Illinois Section of the MAA Spring Meeting, Roosevelt University, April 2013

## Computer Skills

Experienced user in standard platforms and programs
Fluent in LaTeX, C++, HTML, Java, Mathematica, Maple languages
Knowledge of ML, MATLAB, Visual Basic, SQL languages

## Service

Faculty Elections Committee (Chairperson, 2018-), North Central College, 2017-
Faculty Athletic Representative to the NCAA, North Central College, 2016-
Chaplain Advisory Council, North Central College, 2016-
Grievance Panel, North Central College, 2016 -
FCC Amateur Radio Technician, Technician Class license (KC9VIG), 2012-
NCC Cycling & Multisport Club, Faculty Advisor, North Central College, 2011-
Reviewer, *Mathematical Reviews*, 2006-
Calendar Task Force, North Central College, 2016-
Enactus/Students In Free Enterprise (SIFE), Sam Walton Faculty Fellow, William Jewell College,
    2008-2010, North Central College, 2010-2017
Co-chair, Co-Curricular Subcommittee for the Strategic Plan, North Central College, 2016
Book Review (non-published), *Diagram Genus, Generators and Applications*, A. Stoimenow, CRC
    Press/Chapman and Hall, 2015
Director-at-Large, Illinois Section of the Mathematical Association of America, 2014-2016
Faculty Chair, Committee on Enrollment Management, Athletics and Student Affairs, North
    Central College, 2014 - 2016
Project Co-Director, *$E^2$(Expository Engagement): North Central Math Circle*, North Central College,
    2013-2015
Coleman Foundation Faculty Fellow, North Central College, 2013-2015
Cultural Events Committee, North Central College, 2013-2014
Faculty Committee on Enrollment Management, Athletics, and Student Affairs, North Central
    College, 2012-2013
Advisory Panel, American Mathematics Competition, The Mathematical Association of America,
    2008-2013
Faculty Mentor, North Central College Wrestling, North Central College, 2010-2013
Curriculum and Educational Policy Committee (CEPC), William Jewell College, 2009-2010
CEPC Transfer Policy Subcommittee, William Jewell College, 2009-2010
Area Coordinator, Applied Critical Thought & Inquiry Department, William Jewell College, 2009-
    2010
Active Engagement Committee, Applied Critical Thought & Inquiry Department, William Jewell
    College, 2009-2010
Pryor Leadership Committee, William Jewell College, 2009-2010
Rotoract, Faculty Advisor, William Jewell College, 2009-2010
Faculty Sponsor, Student Mathematics Competition Teams, William Jewell College, 2008-2010
NC Outward Bound School Pryor Leadership Faculty Participant, Florida Everglades, 2008-2009
Athletic Council, William Jewell College, 2008-2009
College Conduct Committee, William Jewell College, 2008-2009
Sophomore Experience Faculty Liaison, William Jewell College, 2007
Statistical Reviewer, Departments of Education and Nursing, William Jewell College, 2007-2008

## Professional Memberships

Mathematical Association of America (MAA), Council on Undergraduate Research (CUR), Pi Mu
Epsilon, Faculty Athletics Representatives Association (FARA)

## Honors and Awards

Phi Beta Kappa Society Inductee and Member, 2002-

Clarence F. Dissinger Prize for Distinguished Faculty Scholarship, Senior Faculty, North Central College, 2019

Clarence F. Dissinger Award for Distinguished Teaching and Mentoring, North Central College, 2015

Enactus Sam's Club Step Up for Small Business Challenge, National Finalist, $1000, Faculty Sponsor, North Central College, 2015

SIFE Lowe's Community Improvement Project National Finalist, $5000, Faculty Sponsor, North Central College, 2012

SIFE Sam's Club Challenge Top 3 National Finalist Faculty Sponsor, $2000, William Jewell College, 2010

President's Volunteer Service Award, 2009

The University of Iowa Presidential Fellowship, 2002-2007

## References

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