

Inga Johnson

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Education

University of Oregon, Eugene. Ph.D. in Mathematics, June, 2001. Dissertation title, "The Effect of Multiplication by 2^k on the Root Invariant," under the direction of Professor Hal Sadofsky.

University of Oregon, Eugene. M.S. in Mathematics, June, 1997.

Richard Stockton College of New Jersey, Pomona, New Jersey. B.A. in Mathematics, June, 1995.

Embry-Riddle Aeronautical University, Daytona Beach, Florida. Private Pilot License, S.E.L. Attended from June, 1990 to May, 1992.

Publications

- [1] I. Johnson. The effect of multiplication by 2^k on the root invariant. *Topology and Its Applications*, **141** (2004) 21–57.
- [2] F. R. Cohen, I. Johnson. On the degree two map of a sphere. *Recent Developments in Algebraic Topology*. 83–99 Contemp. Math., **407**, Amer. Math. Soc., Providence, RI, 2006.
- [3] I. Johnson, J. L. Merzel. A class of left ideal of the Steenrod algebra. *Homology, Homotopy and Applications*, vol. **9** (1), 2007, pp.185–191.
- [4] I. Johnson, S. Powers, C. Starr, C. Trevelyan, C. Webster. The solution to a Frobenius-level problem. Accepted pending revisions in *Journal of Integer Sequences*. Preprint available on my website.
- [5] P. Cudworth, T. Dailey, I. Johnson, B. Kehr, C. Starr. The solution to another Frobenius-level problem. In preparation.

Current research interests include algebraic topology and homotopy theory. In particular, stable homotopy groups of spheres and the root invariant, the Steenrod algebra, stunted projective spaces, loop spaces, and unstable maps on loops of a sphere. Additional interests include, Frobenius problem and Frobenius sets.

Teaching Experience

Willamette University, Assistant Professor.
Fall 2004 – present.

Three courses taught each semester, some courses included additional labs.

University of Rochester, Visiting Assistant Professor. Fall 2001 – Spring 2004.

Two courses taught each semester.

University of Oregon, Graduate Teaching Fellow. Fall, 1995 – Spring, 2001.

As a Graduate Teaching Fellow at the University of Oregon I was an independent instructor rather than a teaching assistant. I had the responsibility of supervising homework graders, writing my own exams, determining the grading breakdown for each class and creating different activities for my class.

Pre-College Education Development

Mathematician and Teacher in Participation with Warner School NSF Grant to Deepen Content Knowledge of K-12 math teachers. I have developed and taught courses for K-12 teachers to deepen their content knowledge in mathematics. University of Rochester 2002-2004.

**Grants,
Awards and
Fellowships**

Willamette Valley Consortium for Undergraduate Mathematics Research, REU-RET site grant, \$491,400 An NSF funded three year grant for organizing and mentoring undergraduate research. Research teams include 4 students, 1 teacher, 2 faculty mentors at each of 4 the four Consortium schools: Linfield, Lewis & Clark, the University of Portland, and Willamette. Activities include math and computer science research, invited talks by members of industry and academia, mini-conferences within the Consortium, networking & community building, and regional conferences to present results. Co-PI Colin Starr.

2006 Hewlett Grant Recipient Bridge Funding for the Summer Mathematics Undergraduate Research Program.

Willamette University Junior Faculty Leave Award A semester leave taken spring semester 2007.

Willamette University Merit Award Awarded in fall 2005 for scholarship.

University of Oregon Harrison Award Recipient, 2001. Awarded for outstanding potential in research.

National Project NExT Fellow, 2002. AMS sponsored National NExT Fellow.

**Courses
Taught**

Real Analysis. Real numbers, sequences & series, limits, continuous functions, differentiation, Riemann integral, uniform convergence.

Contemporary Mathematics. A survey of mathematical topics for liberal arts students.

Chaos and Fractals. A discovery of chaos theory and fractals through theory, WinFract, and Mathematica.

Foundations of Advanced Mathematics. A course on set theory, functions, and cardinality with emphasis on proof reading and proof writing.

Linear Algebra. A second course in linear algebra with emphasis on theory through proofs, and proof writing.

Calculus, Multivariable Calculus, and Quest Calculus. Quest Calculus includes proofs and more challenging Calculus problems. University of Rochester. Taught from both the Harvard calculus reform textbook, and from Stewart.

Calculus for Biology I, II, & Business Calculus I, II. Differential and integral calculus taught from a modeling viewpoint and an economics/finance viewpoint respectively.

Elementary Functions. A pre-calculus class with emphasis on trigonometric functions.

College Algebra. A pre-calculus algebra class.

University Mathematics I, II. A survey course in mathematics for non-majors.

Introduction to Probability and Statistics. Teaching Assistant.

College Science Teaching, Seminar Course. University of Oregon, course taken Winter, 1999. This course brought together graduate students from the math and science departments to discuss teaching college level math and science courses.

Teaching interests include: the Moore method, collaborative teaching and learning techniques, hands on learning, Webwork and web based learning, teaching current and future math teachers.

Academic Services

Willamette Committee for Undergraduate Grants and Awards. Willamette University 2005-2007.

Department of Mathematics Hiring Committee Member. Willamette University, 2005-2006 & 2006-2007.

Lead Member of Take Five Proposal Team. Willamette University 2006-2007.

Poster Session Judge. Willamette University, Professor McNicholas's Linear Algebra class. 2006-2007.

Faculty Advisor for Ultimate Frisbee Club. Willamette University 2006-2007.

Faculty Advisor of Mathematical Contest in Modeling Teams. Two teams of three Willamette undergraduates are preparing to compete in the Mathematical Contest in Modeling (MCM) in February 2006. The MCM is a contest where teams of undergraduates use mathematical modeling to present their solutions to real world problems.

Organizer of Basic Notions Seminar. This monthly seminar was established fall 2004 at Willamette University. Colleagues with in the Department of Mathematics and invited speakers present their current research and mathematical interests to peers and advanced undergraduate students. 2005-2006.

Faculty Advisor for Society of Undergraduate Mathematics Students, (SUMS). SUMS is the University of Rochester's math club. I organized and invited speakers for three or four undergraduate math talks each semester. I organized and traveled with groups of undergraduates to local MAA conferences. In Fall 2002, I organized a group of forty students, staff, and faculty members, to go to the play *PROOF*. University of Rochester, 2001-2003.

Assistant for Webwork Mini-course at MAA-AMS Joint Meetings. January, 2003.

Faculty Advisor for University of Rochester Club Soccer Team. 2003-2004.

Standards for Success, Focus Group Member. University of Oregon mathematics focus group member for the National Conversation on Key Knowledge and Skills for University Success. This is a joint project of The Association of American Universities and The Pew Charitable Trusts to identify what knowledge and skill entering students must have to be successful at AAU universities. 2000-2001.

Panel of Experienced G.T.F.'s. Gave advice to incoming graduate students on time management, teaching techniques, how to pick an advisor and other aspects of getting a Ph.D. University of Oregon, 2000.

Manager and Player for the University of Oregon Mathematics Department Intramural Soccer Team. Brought together professors, graduate students, and undergraduates to play in an intramural soccer league. League Champions, Spring 1997 and 1999.

Anchorsplash; Judge for Synchronized Swimming Competition. I was selected to be a faculty judge for Anchorsplash which is a "for charity" event sponsored by Delta Gamma. Fall 2002.

Talks Given

An Introduction to Homotopy Theory. Mathematics Colloquium, Willamette University. May 2007.

Conway's Classification of Rational Tangles. Invited Speaker, University of Rochester Society of Undergraduate Math Students. February 2007.

The Nature of Mathematical Research. Joint presentation with Colin Starr. Willamette Faculty Colloquium, October 2006.

The degree 2 map for a sphere. Poster presentation. MAA-AMS Joint Meeting Conference. San Antonio, TX. January 2006.

On the degree 2 map for a sphere. University of Oregon Topology Seminar. Winter 2006.

Group exams in calculus. Pacific Northwest MAA Conference. University of Puget Sound, Tacoma, Washington. Spring 2005.

Homotopy theory and the degree 2 map on the sphere. Pacific Northwest MAA Conference. University of Puget Sound, Tacoma, Washington. Spring 2005.

An introduction to WeBWorK. (two day seminar) Pacific Lutheran University. June 2004.

Multiplication by 2 and the H-space squaring map on $\Omega^k S^{n+k}$. AMS-MAA Joint Meeting Conference. Phoenix, Arizona, January 2004.

Loops on the degree 2 map of an odd sphere. Cornell University Topology Seminar, invited speaker, November, 2003.

On the degree 2 map for a sphere. University of Chicago Topology Seminar, invited speaker, November, 2003.

On the degree 2 map for a sphere. SUNY Binghamton AMS sectional meeting. Invited speaker in special session honoring Peter Hilton's 80th birthday, October, 2003.

Loops on the degree 2 map and the H-space squaring map on ΩS^{2n+1} . University of Rochester Topology Seminar, October, 2003.

Factorizations of Powers of 2 on Stunted Projective Spaces and the Root Invariant. Massachusetts Institute of Technology Topology Seminar, invited speaker, November, 2002.

Stunted Projective Spaces and the Root Invariant. Topology Seminar at the University of Rochester, Fall 2001.

The Effect of 2^k on the Root Invariant. Cascade Topology Seminar, invited Speaker, University of Oregon, November, 2000.

Factorizations on Projective Spaces. Topology-Geometry Seminar, University of Oregon, February, 2000. An explanation of the Root Invariant's role in stable homotopy theory and some of my early results regarding the Root Invariant and Real Stunted Projective Spaces.

James Periodicity. Topology-Geometry Seminar, University of Oregon, October, 1998. An explanation of James Periodicity of Stunted Projective Spaces via Thom spaces.

Factoring maps on Stunted Projective Spaces. Homotopy Seminar, University of Oregon, November, 2000.

The Root Invariant. Homotopy Seminar, University of Oregon, October, 2000.

Introduction to Stable Homotopy Theory. Homotopy Seminar, University of Oregon, January, 2000. A brief introduction to spectra and Lin's theorem, and an explanation how James Periodicity and the Root Invariant give information about differentials in the EHP spectral sequence.

Freudenthal Suspension Theorem. Homotopy Seminar, University of Oregon, April, 2000. A proof of the Freudenthal Suspension Theorem via the Serre spectral sequence.

Vector Bundle Basics. Homotopy Seminar, University of Oregon, April, 2000. A survey of vector bundles and their applications.

Computer Skills Mathematica; Winfract: a fractal generator for Windows; Webwork: an online homework distribution and grading system; Unix; HTML; LaTeX.

**Conferences
Attended**

MAA Pacific Northwest Sectional Meeting. Linfield College, McMinnville, Oregon. April 2007.

Project NExT Pacific Northwest Sectional Meeting. Linfield College, McMinnville, Oregon. April 2007.

Learning Spaces and Technology Workshop, CIC & NITLE. University of Puget Sound, Tacoma, Washington. March 2007. Attended at the request of Dean Carol Long.

Complex Cobordism and Homotopy Theory: its impacts and prospects. Johns Hopkins University, Baltimore, Maryland. March 2007.

MAA-AMS Joint Meetings Conference. New Orleans, Louisiana. January 2007. San Antonio, Texas. January 2006.

MAA Pacific Northwest Sectional Meeting. University of Puget Sound, Tacoma, Washington. Spring 2005. Invited speaker.

AMS Eastern Sectional Meeting. Invited speaker in special session honoring Peter Hilton's 80th birthday. Binghamton, New York, October 11-12, 2003.

Fields Institute Program on Homotopy Theory and its Applications. University of Western Ontario, London, Ontario September, 2003.

Topology Conference in Honor of John Moore's 80th Birthday. University of Rochester, Rochester, New York, May, 2003.

MAA-AMS Joint Meetings Conference. Phoenix, Arizona, January 2004. Baltimore, Maryland, January 2003. New Orleans, Louisiana, January 2001.

MAA Seaway Sectional meeting. Brock University, St. Catharines, Ontario, Canada, Fall 2001. SUNY Brockport, Brockport, New York, Spring 2002. Rochester Institute of Technology, Rochester, New York, Fall 2003. I attended these conferences with undergraduates from the University of Rochester.

Northwestern University International Conference on Algebraic Topology. March 24-28, 2002.

MAA Mathfest. Burlington, Vermont, July 2002. Boulder, Colorado, July 2003.

Homotopie stable, nilpotence et périodicité. Une introduction (sous la direction scientifique de M. J. Hopkins). An introduction to stable homotopy, nilpotence and periodicity. A five day workshop/conference under the direction of Mike Hopkins. CIRM, Luminy, France, January, 2001.

Cascade Topology Seminar. November, 2000, at The University of Oregon, Eugene, Oregon, **Invited Speaker.** May, 2000, at Portland State University, Portland, Oregon. October, 1999, at The University of British Columbia, Vancouver, British Columbia. May, 1999, at The University of Puget Sound, Tacoma, Washington. November, 1998, at Boise State University, Boise, Idaho.

Homotopy Methods in Algebraic Topology. AMS-IMS-SIAM Joint Summer Research Conference. University of Colorado, Boulder, Colorado, June, 1999.

Pacific Northwest Geometry Seminar. MSRI, Berkeley, California, February, 2000.