

# Peter D. Horn

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## Appointments

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Assistant Professor Syracuse University	2012–
National Science Foundation Postdoctoral Research Fellow Columbia University Scientific sponsor: Peter Ozsváth	2009–2012
Mathematical Sciences Research Institute, Postdoctoral Member <i>Homology Theories of Knots and Links</i>	2010

## Education

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Rice University Ph.D. in Mathematics Thesis title: <i>Higher-order analogues of genus and slice genus of classical knots</i> Thesis advisor: Tim Cochran	May 2009
Hendrix College B.A in Mathematics	May 2004

## Research Interests

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Low-dimensional topology, particularly the theory of knots and links, and non-commutative group theory.

## Publications and Preprints

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1. Noncommutative knot Floer homology  
with Tim Cochran, Shelly Harvey, and Constance Leidy  
in preparation
2. On the intersection ring of graph manifolds  
with Margaret Doig  
to appear in *Transactions of the American Mathematical Society*  
at [arXiv:1412.3990](https://arxiv.org/abs/1412.3990)
3. On computing the first higher-order Alexander modules of knots  
*Experimental Mathematics*, 23 (2014), no. 2, 153–169  
at [Exp. Maths' website](http://Exp.Maths.org) or [arXiv:1303.1545](https://arxiv.org/abs/1303.1545)
4. Structure in the bipolar filtration of topologically slice knots  
with Tim Cochran  
*Algebraic & Geometric Topology*, 15 (2015), 415–428  
at [AGT's website](http://AGT.org) or [arXiv:1208.5788](https://arxiv.org/abs/1208.5788)
5. Filtering smooth concordance classes of topologically slice knots  
with Tim Cochran and Shelly Harvey  
*Geometry & Topology*, 17 (2013), 2103–2162  
at [G&T's website](http://G&T.org) or [arXiv:1201.6283](https://arxiv.org/abs/1201.6283)

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6. Knot concordance and homology cobordism  
with Tim Cochran, Bridget Franklin, and Matthew Hedden  
*Proceedings of the American Mathematical Society*, **141** (2013), 2193-2208  
at [PAMS's website](#) or [arXiv:1102.5730](#)
7. Higher-order signature cocycles for subgroups of mapping class groups and homology cylinders  
with Tim Cochran and Shelly Harvey  
*International Mathematics Research Notices*, **2012**, no. 14, 3311-3373, doi:10.1093/imrn/rnr149.  
at [IMRN's website](#) or [arXiv:1003.4977](#)
8. A higher-order genus invariant and knot Floer homology  
*Proceedings of the American Mathematical Society*, **138** (2010), 2209-2215  
at [PAMS's website](#) or [arXiv:0901.2095](#)
9. Higher-order analogues of the slice genus of a knot  
*International Mathematics Research Notices*, **2011**, no. 5, 1091-1106  
at [IMRN's website](#) or [arXiv:0807.0434](#)
10. The non-triviality of the Grope filtrations of the knot and link concordance groups  
*Commentarii Mathematici Helvetici*, **85** (2010), no. 4, 751-773  
at [CMH's website](#) or [arXiv:0804.2661](#)
11. The first-order genus of a knot  
*Mathematical Proceedings of the Cambridge Philosophical Society*, **146** (2009), 135-149  
at [Cambridge's website](#) or [arXiv:0712.1010](#)
12. Modeling the impact of forest fragmentation on predator-prey systems  
with Ryan Westbrook  
*Pi Mu Epsilon Journal*, **12** (2004), no. 1

### Fellowships and Awards

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Simons Foundation Collaboration Grant for Mathematicians "Topologically slice knots via higher-order techniques"	2015-2020
NSF DMS 1258630 "Higher-order phenomena in knot theory"	2012-2016
NSF Mathematical Sciences Postdoctoral Research Fellowship Columbia University	2009-2012
Lodieska Stockbridge Vaughn Fellowship Rice University	2008-2009
NSF Vertical Integration of Research and Education Fellowship Rice University	2006-2008
Graduate Fellowship Rice University	2004-2006
Richard V. Andree Award <i>Pi Mu Epsilon Journal</i>	2004
Walter E. Hogan Award Hendrix College	2004
Phillip E. Parker Undergraduate Research Award Hendrix College	2004

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Barry M. Goldwater Scholarship	2003
Elizabeth McHenry and Harry I. Lane Award Hendrix College	2002

### Conference and Colloquium Talks

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Noncommutative knot Floer homology The 32nd Annual Workshop in Geometric Topology Texas Christian University	June 2015
Noncommutative knot Floer homology Moab Topology Conference Utah State University - Moab	May 2015
Homology Cobordism of Graph Manifolds AMS Special Session on <i>Invariants in Low-Dimensional Topology</i> , Fall Central Sectional Meeting University of Wisconsin - Eau Claire	October 2014
Homology Cobordism of Graph Manifolds AMS Special Session on <i>Invariants in Low-Dimensional Topology</i> , Spring Eastern Sectional Meeting University of Maryland, Baltimore County	March 2014
Computing higher-order Alexander polynomials Low-dimensional Topology, Knots, and Orderable Groups, a Conference in Honor of Dale Rolfsen CIRM (Centre International de Rencontres Mathématiques), Marseille, France	July 2013
Computing higher-order Alexander polynomials AMS Special Session on <i>Homological Invariants in Low-dimensional Topology</i> , Eastern Sectional Meeting Boston College	April 2013
Computing higher-order Alexander polynomials 47th Spring Topology and Dynamics Conference Central Connecticut State University	March 2013
How many colors are needed to color a map? Pi Mu Epsilon Meeting Syracuse University	Feb 2013
Topologically slice knots and bipolarity AMS Special Session on <i>Knot theory and 4-manifolds</i> , Central Section Meeting University of Akron	Oct 2012
Topologically slice knots and bipolarity AMS Special Session on <i>Combinatorial methods in knot theory</i> , Southeastern Section Meeting Tulane University	Oct 2012
Untying knots in four-dimensional space Colloquium Smith College	March 2012
Four-dimensional equivalence relations on knots Colloquium University of Texas at Dallas	Feb 2012
Untying knots in four-dimensional space Colloquium Sam Houston State University	Feb 2012

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Four-dimensional equivalence relations on knots Colloquium Syracuse University	Jan 2012
Knot concordance and homology cobordism AMS Special Session on <i>Knot Theory</i> Joint Mathematics Meetings, Boston	Jan 2012
Filtering topologically slice knots AMS Special Session on <i>Knot Theory</i> Joint Mathematics Meetings, New Orleans	Jan 2011
Higher-order signature cocycles for the mapping class group Knot Concordance and Homology Cobordism Workshop Wesleyan University	July 2010
Higher-order signature cocycles for the mapping class group AMS Eastern Sectional Meeting New Jersey Institute of Technology	May 2010
Generalizing the genus of a knot Bi-college Mathematics Colloquium Haverford College	April 2010
Higher-order genera of knots AMS Eastern Sectional Meeting Wesleyan University	Oct 2008
The Grope filtration and higher-order genera of knots Fifty Years Since Fox and Milnor, a Conference in Honor of Jerry Levine Brandeis University	June 2008
Higher-order genera of knots AMS Southeastern Sectional Meeting Louisiana State University	March 2008
Non-triviality in the Grope filtration of the knot concordance group Third Annual Louisiana-Texas Topology Retreat Rice University	Feb 2008
Bipolar plots MAA MathFest University of Colorado at Boulder	July 2003
Modeling the impact of forest fragmentation on predator-prey populations REU-VIGRE Conference Texas A&M University	July 2003

### Seminar Talks

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2015

- Boston College

2014

- Syracuse University (two talks) • Wesleyan University

2013

- Syracuse University • University at Buffalo SUNY • Louisiana State University (two talks)

2012

- Syracuse University

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2011

- Wesleyan University • SUNY Stony Brook • Louisiana State University • Princeton University
- Columbia University

2010

- Columbia University (two talks) • Brandeis University • Rutgers University • City University of New York • University of Virginia • Wesleyan University • Rice University

2009

- Columbia University (two talks) • Louisiana State University

2007

- Trinity University

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## Teaching

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### Syracuse University

- MAT 295 Calculus I (Course Supervisor) Fall 2014
- MAT 414 Introduction to ODEs Spring 2014
- MAT 531 Second Course in Linear Algebra Fall 2013
- MAT 661 Introduction to Point Set Topology Fall 2013
- MAT 761 Introduction to Algebraic Topology Spring 2013
- MAT 331 First Course in Linear Algebra Fall 2012
- MAT 397 Calculus III Fall 2012

### Columbia University

- REU: “Applications of Knot Floer Homology” Summer 2012
- Independent Study/Research Course (three students) Fall 2011
- Calculus II Fall 2011
- Calculus III Fall 2011
- REU: “Non-commutative Knot Invariants” Summer 2011
- Calculus I Fall 2009
- Calculus II Fall 2009

### Rice University

- Linear Algebra Summer 2007
- Ordinary Differential Equations and Linear Algebra Summer 2006
- Multivariable Calculus Spring 2006
- Multivariable Calculus Summer 2005

## Service and Professional Activities

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Colloquium Organizer  
2014-

Member of the Graduate Committee  
2013-2014

Lower Division Advisor  
2013-

Co-organizer of the Special Session in “Geometric and low-dimensional topology”  
The 47th Spring Topology and Dynamics Conference  
Central Connecticut State University, March 2013

Co-organizer of the Geometry and Topology Seminar  
Syracuse University  
2012-

Member of the Search Committee  
2012

Co-organizer of the Special Session in “Low-dimensional topology”  
AMS Southeastern Section Spring Meeting  
University of South Florida, March 2012

### Referee

*Indiana Journal of Mathematics, International Mathematics Research Notices, Journal of the London Mathematical Society, Michigan Mathematical Journal, Algebraic & Geometric Topology, Pacific Journal of Mathematics, Communications in Analysis and Geometry*, various governmental funding agencies

Graduate Teaching Seminar Participant  
Rice University, 2004-2006

## **Peter D. Horn**

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### **Logistics Coordinator**

Rice University Mathematical Institute for Young Women, 2008

### **Graduate Student Liaison to the Graduate Committee**

Rice University Department of Mathematics, 2005-2009

### **Peer Academic Mentor**

Hendrix College, 2002-2003

Mentored a dozen freshman students regarding their personal and academic endeavors