

Karen Lange

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Citizenship United States

Research Interests Computability (Recursion) theory. Computable structure theory.

Education

- 2002–2008 **The University of Chicago**, Chicago, IL
Ph.D. in Mathematics, June 2008
Thesis: The computational complexity of homogeneous models
Advisors: Robert Soare and Denis Hirschfeldt
M.S. in Mathematics, June 2004.
- 1998–2002 **Swarthmore College**, Philadelphia, PA
B.A. Mathematics Major, Computer Science Minor; Graduated with High Honors

Employment

- 2011– **Assistant Professor**, Wellesley College
2008– 2011 **Visiting Assistant Professor**, University of Notre Dame
National Science Foundation Postdoctoral Research Fellow

Published and Accepted Papers

1. *Induction, bounding, weak combinatorial principles, and the homogeneous model theorem*, D. Hirschfeldt, K. Lange, and R. Shore, To appear in *Memoirs of the American Mathematical Society* (Accepted 2015).
2. *Classifications of structures*, K. Lange, R. Miller, and R. Steiner, To appear in *Notre Dame Journal of Formal Logic* (Accepted 2015).
3. *\mathcal{D} -maximal sets*, P. Cholak, P. Gerdes, and K. Lange, *Journal of Symbolic Logic*, 80(4) (2015), 1182-1210.
4. *Representing Scott sets in algebraic settings*, A. Dolich, J. Knight, K. Lange, and D. Marker, *Archive for Mathematical Logic*, 54(5-6) (2015), 631-637.
5. *A valuation theoretic characterization of recursively saturated real closed fields*, P. D'Aquino, S. Kuhlmann, and K. Lange, *Journal of Symbolic Logic*, 80(1) (2015), 194-206.

6. *The arithmetical hierarchy in the setting of ω_1 computability*, J. Carson, J. Johnson, J. Knight, K. Lange, C. McCoy, and J. Wallbaum, *Computability*, 2(2) (2013), 93-105.
7. *Complexity of structures associated with real closed fields*, J. Knight and K. Lange, *Proceedings of the London Mathematical Society, Third Series*, 107(1) (2013), 177-197.
8. *Degrees of orders on torsion-free abelian groups*, A. Kach, K. Lange, and D. Solomon, *Annals of Pure and Applied Logic*, 164(7-8) (2013), 822-836.
9. *Real closed exponential fields*, P. D'Aquino, J. Knight, S. Kuhlmann, and K. Lange, *Fundamenta Mathematicae*, 219(2) (2012), 163-190.
10. *Describing free groups*, J. Carson, V. Harizanov, J. Knight, K. Lange, C. Maher, C. McCoy, A. Morozov, S. Quinn, and J. Wallbaum, *Transactions of the American Mathematical Society*, 364(11) (2012), 5715-5728.
11. *On n -tardy sets*, P. Cholak, P. Gerdes, and K. Lange, *Annals of Pure and Applied Logic*, 163(9) (2012), 1252-1270.
12. *Limit computable integer parts*, P. D'Aquino, J. Knight, and K. Lange, *Archive for Mathematical Logic*, 50(7-8) (2011), 681-695. Erratum-ibid. 54(3-4) (2015), 487-489.
13. *A characterization of the $\mathbf{0}$ -basis homogeneous bounding degrees*, K. Lange, *Journal of Symbolic Logic*, 75(3) (2010), 971-995.
14. *The degree spectra of homogeneous models*, K. Lange, *Journal of Symbolic Logic*, 73(3) (2008), 1009-1028.
15. *Computability of homogeneous models*, K. Lange and R. Soare, *Notre Dame Journal of Formal Logic*, 48(1) (2007), 143-170.
16. *Patterns, linesums, and symmetry*, E.E. Eischen, C. R. Johnson, K. Lange, and D. Stanford, *Linear Algebra and its Applications*, 357 (2002), 273-289.

Submitted and Working Papers

1. *Bounded low and high sets*, B. Anderson, B. Csima, and K. Lange, Submitted.
2. *Lengths of developments in $K((G))$* , J. Knight and K. Lange, In preparation (Preprint available).

Research Conference Talks (Invited unless noted)

1. ASL North American Annual Meeting, University of Connecticut, Plenary Talk, May 25, 2016.
2. Joint Mathematics Meetings, Special Session on Surreal Numbers, Seattle, January 8, 2016.
3. AMS Sectional Meeting, Special Session on Computability Theory and Applications, Loyola University, October 3, 2015.
4. Logic Colloquium 2015 (ASL European Summer Meeting), Special Session on Computability Theory, Helsinki, Finland, August 7, 2015.
5. JAF/MAMLS Conference, Graduate Center CUNY, July 9, 2015.

6. New England Recursion and Definability Seminar, University of Connecticut, May 2, 2015.
7. AMS Sectional Meeting, Special Session on Computable Structure Theory, Georgetown University, March 7, 2015.
8. Canadian Mathematical Society Meeting, Special Session on Computability Theory, Hamilton, Canada, December 8, 2014.
9. American Institute of Mathematics, Computable Stability Workshop, Workshop seminar, August 16, 2013.
10. ASL North American Annual Meeting, Special Session on Computable Structure/Model Theory, University of Waterloo, May 9, 2013.
11. Joint Mathematics Meetings, Special Session on Effective Algebra and Model Theory, San Diego, January 9, 2013.
12. Semantics and Syntax: A Legacy of Alan Turing, Newton Institute, United Kingdom, May 29, 2012.
13. New England Recursion Theory and Definability Seminar, University of Connecticut, April 29, 2012.
14. AMS Sectional Meeting, Special Session on Computable Mathematics (in honor of Alan Turing), George Washington University, March 17, 2012.
15. Mid-Atlantic Mathematical Logic Seminar (MAMLS), Graduate Center CUNY, March 10, 2012.
16. AWM Anniversary Conference, Model Theory Special Session, Brown University, September 17, 2011.
17. AMS Sectional Meeting, Special Session on Computability and its Applications, College of Holy Cross, April 9, 2011.
18. ASL North American Annual Meeting, Contributed Talk, University of California-Berkeley, March 25, 2011.
19. Joint Mathematics Meetings, Special Session on Transseries and Ordered Exponential Fields, New Orleans, January 6, 2011.
20. Workshop on Computability Theory 2010, Azores, Portugal, July 6, 2010.
21. Joint Mathematics Meetings, Special Session on Surreal Numbers, San Francisco, January 13, 2010.
22. Maltsev Meeting, Contributed Talk, Sobolev Institute of Mathematics, Novosibirsk, Russia, August 25, 2009.
23. ASL North American Annual Meeting, Special Session on Computability Theory, University of Notre Dame, May 20, 2009.
24. NY Women in Math Network, Poster Session, May 2, 2008.
25. Graduate Student Conference in Logic, Contributed Talk, University of Illinois-Chicago, April 29, 2007.
26. Graduate Student Conference in Logic, Contributed Talk, University of Wisconsin-Madison, April 29, 2006.

27. AMS Sectional Meeting, Special Session on Model Theory and Computability, University of Notre Dame, April 8, 2006.
28. AMS Sectional Meeting, Special Session on Computability Theory and its Applications, Northwestern University, October 23, 2004.

Research Colloquia

- University of Notre Dame (F2007, S2016), • Graduate Center CUNY (S2009, S2013, S2015), • Second University of Naples (Su2013), • University of Konstanz (Su2011-13),
- Cornell University (S2012), • Wesleyan University (S2011), • University of Waterloo (S2011), • Ohio State University (S2010), • University of Illinois-Chicago (F2009),
- University of Connecticut (S2008)

Undergraduate Colloquia

- Swarthmore College (S2016), • Springfield College (S2016), • Hampshire College Summer Studies in Mathematics (High school) (Su2015), • University of Connecticut (F2013),
- Carleton College, Summer Mathematics Program for Women (SMP) (Su2008-11, Su2013),
- Colby College (F2012), • Canada/USA MathCamp at University of Puget Sound (High school) (Su2012), • North Shore Undergraduate Math Conference (Keynote Speaker) at Gordon College (S2012), • Wentworth Institute of Technology (S2012), • Bowdoin College (S2010), • University of Notre Dame (S2010), • Wellesley College (S2010), • Bucknell University (S2008), • Dickinson College (S2008), • UMTYMP - University of Minnesota (High school) (S2008)

Awards, Grants, and Scholarships

1. Principal Investigator, National Science Foundation Division of Mathematical Sciences (DMS) Research at an Undergraduate Institution (RUI) Grant, *Connections between computability and algebraic structures*, DMS-1100604, 2011-2016.
2. Wellesley College Faculty Award, *Bounding lengths in $k((G))$* , Summer 2016.
3. Wellesley College Faculty Award, *Classifications of algebraic structures*, Summer 2015.
4. US Junior Oberwolfach Fellow travel grant, February 2012.
5. Project NExT 2011-2012 Fellow.
6. Computability in Europe 2010 Elsevier Foundation Travel Grant, 2010.
7. National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship, DMS-0802961, 2008-2011.
8. AWM Funded Participant, Workshop for Women Graduate Students and Recent PhDs, 2007.
9. Nomination, Physical Sciences Division Teaching Award, University of Chicago, 2007, 2008.
10. National Science Foundation Graduate Research Fellowship Honorable Mention, 2002.
11. Alice T. Schafer Prize Honorable Mention, 2002.
12. Phi Beta Kappa, Swarthmore College Chapter, 2002.
13. Barry M. Goldwater Scholarship, 2001.

Service to the Profession and Related Experience

- F2015- **Co-Organizer** (with Brooke Andersen), New England Recursion and Definability Seminar (NERDS).
- F2015-S16 **Program Committee Member**, Computability in Europe 2016 Conference.
- F2014 **External Reviewer**, University of Connecticut Dissertation proposal.
- F2013 **Co-organizer** (with Barbara Csima), Special Session on Computability Theory, Computability in Europe 2014, Budapest, Hungary, June 23 - 27, 2014.
- F2013 **Invited Participant**, Workshop on Computable Model Theory, Banff International Research Station, Canada, November 3-8, 2013.
- Su2013 **Program Committee Member**, 2014 Joint ASL/AMS Meeting, January 17-18, 2014.
- S2013 **Co-organizer** (with Rachel Epstein and Russell Miller), Special Session, New England Recursion and Definability Seminar, AMS Eastern Sectional Meeting, Boston College, April 7, 2013.
- S2013 **Judge**, Undergraduate Poster Session, Joint Mathematics Meetings, San Diego, January 11, 2013.
- 2013- **Member**, Committee on Panels, Poster Sessions and Workshops, Mathematical Association of America.
- F2012 **Local Organizer**, New England Recursion and Definability Seminar, Wellesley College, October 2012.
- S2012 **Invited Participant**, Workshop on Computability Theory, Oberwolfach, Germany, February 5-11, 2012.
- F2011 **Member**, Selection Committee for Travel Funding for AWM Anniversary Conference, Brown University, September 17-18, 2011.
- S2011 **External Examiner**, Specialty Graduate Exam, University of Waterloo, January 27, 2011.
- F2010 **Co-organizer** (with Peter Cholak and Peter Gerdes), Special Session in Computability at the AMS Eastern Sectional, University of Notre Dame, November 5-7th, 2010.

Referee or Reviewer

Annals of Pure and Applied Logic
Computability in Europe Conference
Journal of Symbolic Logic
Math Reviews

Teaching Experience

Wellesley College

Basic Statistics (2 times) *Calculus I & II* *Multivariable Calculus*
Linear Algebra (3 times) *Abstract Algebra* (2 times) *Number Theory* (IBL Format)
Set Theory (2 times) *Honors Thesis*

University of Notre Dame

Basic Logic *Calculus I* *Computable Model Theory (Grad)*

The University of Chicago

Honors Calculus (full year) *Calculus I & II* *Geometry for In-service Teachers*
Basic Number Theory *Basic Geometry* *Geometry for Teachers (TA)*
Mathematical Logic (TA) *Topics in Geometry (TA)* *Open Ended Approach for In-service Teachers (TA)*

Mentoring and Other Teaching Experience

Su2013, Su15-16 **Advisor**, Undergraduate summer research on *Classifications of subsets of algebraic structures* (4 students total), Wellesley College.

F2015-S16 **Mentor**, Sophomore Early Research Program (SERP), Project focused on mathematics enrichment for local elementary school students (2 students), Wellesley College.

F2015-S16 **Mentor**, Graduate Women at MIT (3 grad students).

S2010-13, S16 **Mentor**, Graduate Education Mentoring Program (SMP-GEM), Joint Mathematics Meetings.

F15 **Author** (with Alissa Crans), *Beyond the classroom*, Math Horizons, 23(1) (2015), 26-29.

S2013, S15 **Mentor**, Independent study in computability theory (4 students total), Wellesley College.

S2014 **Speaker**, Hardy Elementary School (Wellesley Public School), February 28, 2014.

2013-2014 **Advisor**, Undergraduate Honors Thesis, Wellesley College.

Su2012 **Lecturer**, Canada/USA Mathcamp, University of Puget Sound, July 13-18, 2012.

2009-2010 **Mentor**, Independent study in set theory, University of Notre Dame.

2008-2009 **Member**, Faculty Reading Group on Reflective Learning, University of Notre Dame.

- 2006-2008 **Teaching Consultant** for fellow graduate students, Center for Teaching and Learning, **Coordinator** of program 2007-2008, University of Chicago.
- 2004-2006 **Mentor** and **Committee Member**, Undergraduate Directed Reading Program (in mathematics), University of Chicago.
- 2004-2006 **Guest Teacher** in Mathematics, Hinton Elementary School and Songhai Learning Institute (Chicago Public Schools).

Other Service to Home Institution

- 2015-16 **Member**, Department Hiring Committee, Wellesley College.
- S2015 Pi Day **Co-organizer**, March 14, 2015, Wellesley College.
- S2015 **Member**, Department Curriculum Subcommittee, Wellesley College.
- S2015 **Contributor**, *What's Wellesley Reading*, faculty book review series.
- 2012-S14 **Member**, Academic Review Board, Wellesley College.
- 2012- **Advisor** for first years, majors, and minors (approximately 20 students), Wellesley College.
- 2012-S14, F15 **Student Seminar Organizer** (primary or secondary), a weekly student-led mathematics seminar, Wellesley College.
- S2014 **Member**, Undergraduate Thesis Committee, Wellesley College, May 12, 2014.
- S2013 **Panelist**, Grant Writing 101 Event, Wellesley College, April 25, 2013.
- F2011-13, F15 **Judge**, Math Games, Wellesley College, September 20, 2011, October 3, 2012, October 9, 2013, September 16, 2015.
- S2012 **Examiner**, Honors Exam, Wellesley College, May 7, 2012.
- F2011 **Colloquia Coordinator**, Wellesley College.
- S2011 **Examiner**, Ph.D. Defense (Jacob Carson), University of Notre Dame, April 6, 2011.
- 2010 **Examiner**, Specialty Graduate Exams, University of Notre Dame, February 2, 9, 2010, December 7, 2010.
- S2010 **Panelist**, Mathematics Job Search Panel, University of Notre Dame Teaching Seminar, April 29, 2010.
- 2008-2009 **Seminar Coordinator**, University of Notre Dame Logic Seminar.
- S2008 **Panelist**, Winter Workshop on Teaching, University of Chicago, January 23, 2008.
- 2007-2008 **President**, AWM Student Chapter, University of Chicago.
- 2006-2007 **Treasurer**, AWM Student Chapter, University of Chicago.

Other Experience

Su2007 **Intern**, Friedrich, Klatt and Associates (a computer consulting and software development firm), Chicago, Illinois.

Undergraduate Programs Attended

- F2001 Budapest Semesters in Mathematics (Combinatorics, Graph Theory, Topology, Hungarian).
- Su2001 DIMACS Research Experience for Undergraduates and Exchange with DIMATIA, Prague, Czech Republic (Cluster Analysis), Center for Discrete Mathematics and Theoretical Computer Science.
- Su2000 Research Experience for Undergraduates (Matrix Theory), The College of William and Mary.
- Su1999 Summer Mathematics Program for Women (Dynamics and Game Theory), Carleton College.

Professional Affiliations

American Mathematical Society
Association for Symbolic Logic
Association for Women in Mathematics
Mathematical Association of America