# Lenhard L. Ng

*Curriculum vitae*


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| **E-mail** | `ng[at]math.duke.edu` | **Citizenship** | USA (born 1976, Stanford, CA) |


## RESEARCH INTERESTS

Low-dimensional topology, symplectic and contact geometry, differential geometry, mathematical physics. Particular interests: holomorphic curves, symplectic field theory, knot theory.

## CURRENT POSITION

DUKE UNIVERSITY (started August 2006)

Assistant Professor, Mathematics Department.

On leave Spring 2010 (Member, Mathematical Sciences Research Institute, Berkeley).

## EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (1996–2001)

Ph.D. in mathematics, June 2001, Tomasz Mrowka, advisor.

HARVARD UNIVERSITY (1993–1996)

A.B. *summa cum laude* in mathematics and physics, June 1996.

## PAST EMPLOYMENT

- Visiting Assistant Professor, Princeton University, spring 2007.
- American Institute of Mathematics Five-Year Fellow (postdoctoral), 2001–2006.
- Lecturer in Mathematics and Visiting Scholar, Stanford University, 2002–2006.
- Member, Institute for Advanced Study, 2001–2002.

## SELECTED AWARDS, GRANTS, AND HONORS

- National Science Foundation: NSF CAREER grant DMS-0846346 "Symplectic Field Theory and Low-Dimensional Topology", 2009–2014; Principal Investigator, research grant DMS-0706777 "Holomorphic Curves and Low-Dimensional Topology", 2007–2010.

- American Institute of Mathematics: Five-Year Fellowship (one fellow named per year), 2001–2006.
- Department of Defense: National Defense Science and Engineering Graduate (NDSEG) fellow, 1996–1999.
- Fannie and John Hertz Foundation: selected as fellow, 1996.
- MIT Department of Mathematics: selected for Norman Levinson Fellowship, 1996.
- AMS/MAA/SIAM Frank and Brennie Morgan Prize for undergraduate research in mathematics: honorable mention (second place), 1996.
- William Lowell Putnam Mathematical Competition: Putnam Fellow, 1993, 1994, 1995.
- International Mathematical Olympiad: gold medal, 1992 (Moscow), 1993 (Istanbul); silver medal, 1991 (Sigtuna, Sweden).
- USA Mathematical Olympiad: first place, 1992; winner, 1991, 1993.
- Westinghouse Science Talent Search: third place, 1993.

## PUBLICATIONS

(Most are available at `http://www.math.duke.edu/~ng/math/`.)

1. Grid diagrams, braids, and contact geometry (with D. Thurston), *Proceedings of 15th Gökova Geometry–Topology Conference 2008*, 120–136 (Gökova Geometry–Topology Conference (GGT), Gökova, 2009).
2. Rational Symplectic Field Theory for Legendrian knots, preprint, 2008, arXiv:0806.4598.
3. A family of transversely nonsimple knots (with T. Khandhawit), *Algebr. Geom. Topol.*, to appear.
4. A skein approach to Bennequin type inequalities, *Int. Math. Res. Not.* **2008**, Art. ID rnn116, 18 pp.
5. Transverse knots distinguished by knot Floer homology (with P. Ozsváth and D. Thurston), *J. Symplectic Geom.* **6** (2008), no. 4, 461–490.
6. On arc index and maximal Thurston–Bennequin number, submitted, 2006.
7. A Legendrian Thurston–Bennequin bound from Khovanov homology, *Algebr. Geom. Topol.* **5** (2005), 1637–1653.
8. The correspondence between augmentations and rulings for Legendrian knots (with J. Sabloff), *Pacific J. Math.* **224** (2006), no. 1, 141–150.
9. Plane curves and contact geometry, *Proceedings of Gökova Geometry–Topology Conference 2005*, 162–171 (Gökova Geometry–Topology Conference (GGT), Gökova, 2006).
10. Conormal bundles, contact homology, and knot invariants, in *The interaction of finite type and Gromov–Witten invariants at the Banff International Research Station (2003)*, *Geom. Topol. Monogr.* **8** (2006), 129–144.
11. Framed knot contact homology, *Duke Math. J.* **141** (2008), no. 2, 365–406.
12. Legendrian solid-torus links (with L. Traynor), *J. Symplectic Geom.* **2** (2005), no. 3, 411–443.
13. Knot and braid invariants from contact homology II, *Geom. Topol.* **9** (2005), 1603–1637.
14. Knot and braid invariants from contact homology I, *Geom. Topol.* **9** (2005), 247–297.

15. Problems in low dimensional contact geometry (with J. Etnyre), in *Topology and Geometry of Manifolds*, *Proc. Sympos. Pure Math.* **71** (2003), 337–357.
16. Invariants of Legendrian links and coherent orientations (with J. Etnyre and J. Sabloff), *J. Symplectic Geom.* **1** (2002), no. 2, 321–367.
17. Computable Legendrian invariants, *Topology* **42** (2003), no. 1, 55–82.
18. Maximal Thurston–Bennequin number of two-bridge links, *Algebr. Geom. Topol.* **1** (2001), 427–434.
19. The rook on the half-chessboard, or how not to diagonalize a matrix (with K. Kedlaya), *Amer. Math. Monthly* **105** (1998), no. 9, 819–824.
20. Hamiltonian decomposition of lexicographic products of digraphs, *J. Combin. Theory Ser. B* **73** (1998), no. 2, 119–129.
21. Hamiltonian decomposition of complete regular multipartite digraphs, *Discrete Math.* **177** (1997), no. 1-3, 279–285.
22. $k$-ordered hamiltonian graphs (with M. Schultz), *J. Graph Theory* **24** (1997), no. 1, 45–57.

## SELECTED INVITED TALKS

### Lecture series, minicourses, and colloquia

- Minicourse, Summer Graduate Workshop: Symplectic and Contact Geometry and Topology, Mathematical Sciences Research Institute, August 2009.
- Minicourse, Holomorphic Curves: Algebraic Structures and Geometric Application, Stanford University, August 2008.
- Colloquium, Dartmouth College, May 2008.
- Colloquium, University of North Carolina at Chapel Hill, November 2006.
- Salomon Bochner Lectures in Mathematics, Rice University, October 2006.
- Minicourse, Workshop on Symplectic Field Theory, Universität Leipzig, August 2006.
- Colloquium, University of California at Berkeley, February 2006.
- Colloquium, University of Illinois at Urbana–Champaign, January 2006.
- Colloquium, University of Illinois at Chicago, January 2006.
- Colloquium, Rutgers University, January 2006.
- Colloquium, University of Toronto, January 2006.
- Colloquium, University of Wisconsin, November 2005.
- Colloquium, Columbia University, September 2005.
- Minicourse, Courbes Holomorphes et Topologie de Contact, Summer school sponsored by CNRS, Berder, France, June 2003.

### Invited conference talks

- Introductory Workshop: Symplectic and Contact Geometry and Topology, Mathematical Sciences Research Institute, August 2009.
- Workshop on Mirror Symmetry, Symplectic Geometry, and Related Topics, MIT, June 2009.
- Georgia International Topology Conference, University of Georgia, May 2009.

- Session on low dimensional geometry and topology, AMS Southeastern Sectional Meeting, North Carolina State University, April 2009.
- Interactions of Geometry and Topology in Dimensions 3 and 4, Banff International Research Station, March 2009.
- Illinois/Indiana Symplectic Geometry Conference, University of Illinois at Urbana–Champaign, March 2009.
- AMS special session on categorification and link homology, Joint Mathematics Meetings, Washington, DC, January 2009.
- Math Institutes Modern Mathematics Workshop, Society for Advancement of Chicanos and Native Americans in Science annual conference, Salt Lake City, October 2008.
- Legendrian and Transverse Knots, American Institute of Mathematics, September 2008.
- Gökova Geometry-Topology Conference, Gökova, Turkey, May 2008.
- Knots in Washington XXVI, George Washington University, April 2008.
- Towards Relative Symplectic Field Theory, CUNY, September 2007.
- Communicating Mathematics, University of Minnesota at Duluth, July 2007.
- Interactions of Geometry and Topology in Low Dimensions, Banff International Research Station, March 2007.
- Low Dimensional Topology, Research Program, Park City Mathematics Institute, July 2006.
- Conference on 3-manifold Topology in honor of Peter Shalen, Université de Montréal, June 2006.
- Workshop "Around Khovanov homology", Université du Québec à Montréal, October 2005.
- Holomorphic Curves Workshop, Institute for Advanced Study, June 2005.
- Gökova Geometry/Topology Conference, Gökova, Turkey, June 2005.
- The Interaction of Finite Type and Gromov–Witten Invariants, Banff International Research Station, November 2003.
- Holomorphic Curves in Contact Geometry, American Institute of Mathematics, August 2003.
- Session on contact and symplectic geometry, AMS Eastern Sectional Meeting, Courant Institute, April 2003.
- Symplectic Geometry and Physics Workshop, Institute for Pure and Applied Mathematics, UCLA, March 2003.
- Holomorphic Curves and Low Dimensional Topology, Institute for Advanced Study, March 2002.
- Session on symplectic and contact topology, AMS Southeastern Sectional Meeting, Georgia Institute of Technology, March 2002.
- Georgia International Topology Conference, University of Georgia, May 2001.
- Conference, Stanford University/American Institute of Mathematics program in contact geometry, Stanford University, December 2000.

**Seminar talks**

- 2009: ETH Zürich (2).

- 2008: Stanford University, MIT.
- 2007: Columbia University (2), Princeton University, SUNY Stony Brook, University of Virginia, MIT, Harvard University.
- 2006: University of Texas, Duke University.
- 2005: Bryn Mawr College/Haverford College, University of California–Berkeley (2), Columbia University (2), Georgia Institute of Technology, University of Wisconsin, University of Southern California, University of Illinois at Urbana–Champaign.
- 2004: University of Southern California/California Institute of Technology, Stanford University.
- 2003: University of California–Berkeley, Stanford University, University of Pennsylvania, Harvard University, Haverford College.
- 2002: Columbia University, Stanford University.
- 2001: University of North Carolina, Princeton University.
- 2000: Stanford University, Harvard University.

**SERVICE AND MISCELLANEOUS**

- Organizer for the workshops: "Cyclic Homology and Symplectic Topology", American Institute of Mathematics, November 2009; "Algebraic Structures in the Theory of Holomorphic Curves", Mathematical Sciences Research Institute, November 2009.
- Editor, *Quantum Topology*.
- Reviewed for: Mathematical Reviews; NSF grant panel; Algebraic & Geometric Topology, Communications in Contemporary Mathematics, Discrete Mathematics, Duke Mathematical Journal, Experimental Mathematics, Geometry & Topology, International Journal of Mathematics, International Mathematics Research Notices, Journal of Differential Geometry, Journal of the European Mathematical Society, Journal of Graph Theory, Journal of Knot Theory and its Ramifications, Transactions of the American Mathematical Society.
- Member, Subcommittee for the United States Mathematical Olympiad, Mathematical Association of America, 2009–2011.
- Instructor for San José Math Circle (for middle school students), 2006; Stanford Math Circle (for high school students), 2005.
- Guest lecturer at Canada/USA MathCamp (for high school students), 1997.
- Conducted several undergraduate-level lectures as a staff member at the US Mathematical Olympiad Summer Program, 1994 and 1995; contributed a problem to the 2004 USA Mathematical Olympiad; helped maintain an online archive of solutions for the Putnam Mathematical Competition (since 1997).

*Current as of: August 2009*