

Krishnan Shankar

Department of Mathematics
University of Oklahoma
Norman, OK 73109
(405) 325-4241
Email: shankar@math.ou.edu

318 Emelyn St
Norman, OK 73071
(405) 217-9641
Date of birth: 06/21/1971

Education

- B.A. (Mathematics), Reed College, Portland, Oregon, May 1993.
- Ph.D (Mathematics), University of Maryland, College Park, May 1999.
Advisor: Professor Karsten Grove.

Research Interests: Riemannian geometry & Lie groups: Group actions on non-negatively curved manifolds; Geometric group theory: Dehn functions of groups.

Current status: Professor, Department of Mathematics, University of Oklahoma, Norman, 2010—current.

Previous positions:

- Associate Professor, University of Oklahoma, Norman, OK, 2006–2010.
- Visiting Associate Professor, University of Münster, Münster, Germany, Spring 2009.
- Assistant Professor (tenure track), University of Oklahoma, Norman, OK, 2002–2006.
- T. H. Hildebrandt Research Assistant Professor, University of Michigan, Ann Arbor, MI, 1999–2002.
- Visiting Assistant Professor, University of Augsburg, Germany, Summer 2001.

Selected Publications and Preprints

Differential Geometry

- *On the Fundamental Groups of Positively Curved Manifolds*, *J. Differential Geom.*, **49** (1998), 179–182.
- *Rank Two Fundamental Groups of Positively Curved Manifolds* (joint with Karsten Grove), *J. Geometric Analysis*, **10** (2000), 679–682.
- *Isometry Groups of Homogeneous, Positively Curved Manifolds*, *Diff. Geom. & Appl.*, **14**(1) (2001), 57–78.
- *Spherical rank rigidity and Blaschke manifolds* (joint with Ralf Spatzier and Burkhard Wilking), *Duke Math. J.*, **128**(1) (2005), 65–81.
- *Free, isometric circle actions on compact, symmetric spaces* (joint with Jost Eschenburg and Andreas Kollross), *Geom. Dedicata*, **102** (2003), 35–44.
- *On the cohomogeneity and symmetries of Eschenburg and Bazaikin spaces*, (joint with Karsten Grove and Wolfgang Ziller), *Asian J. of Math.*, 10(3), (S. S. Chern memorial volume, 2006), 647–662.
- *Conjugate points in length spaces*, (joint with Christina Sormani), *Advances in Math.*, **220** (3) (2009), 791–830.
- *Riemannian submersions from simple compact Lie groups*, (joint with Martin Kerin), *Münster Journal of Math.*, **5** (2012), 25–40.

Topology/Group Theory

- *On Complexes Equivalent to S^3 -bundles over S^4* (joint with Nitu Kitchloo), Int. Math. Res. Notices, **8** (2001), 381–394.
- *Strong inhomogeneity of Eschenburg spaces* (with an Appendix written jointly with Mark Dickinson), Michigan Math. J., **50**(1) (2002), 125–142. (2001).
- *Nilpotent Numbers* (joint with Jonathan Pakianathan), Amer. Math. Monthly, **107**, August–September 2000, 631–634.
- *On the diffeomorphism type of the Berger space $SO(5)/SO(3)$* (joint with Nitu Kitchloo and Sebastian Goette), American J. of Mathematics, **126** (2) (2004), 395–416.
- *Snowflake groups, Perron–Frobenius eigenvalues and isoperimetric spectra* (joint with Noel Brady, Martin Bridson and Max Forester), Geom. & Topology, **13** (2009), 141–187.

Honors and Awards

- National Science Foundation PI award (D.M.S. Award #1104352), 2011–2014.
- National Science Foundation PI award (D.M.S. Award #0513981), 2005–2008.
- National Science Foundation PI award (D.M.S. Award #0103993), 2001–2004.
- Irene Rothbaum Outstanding Assistant Professor award, annual award to the best assistant professor in the College of Arts & Sciences; University of Oklahoma, 2006.
- National Science Foundation award (D.M.S. Award #0606626) for conference, “*Future Directions in Global Riemannian Geometry*”, 2006.
- O. U. Faculty Member of the Game; Outstanding Service award, January 2005.
- Junior Faculty Fellowship, Research Council, University of Oklahoma, 2003.
- Herman and Margaret Sokol Postdoctoral Fellowship, awarded to the best post-doctoral fellow in the sciences, University of Michigan, 2001.
- Alfred P. Sloan Dissertation Fellowship, Sloan Foundation, 1998–99.
- Rackham Fellowship, University of Michigan, Ann Arbor, Summer 2000.
- American Mathematical Society Grant (funded by the NSF) to attend *Mathematical Challenges of the Twenty First Century*, UCLA, August 2000.
- University of Maryland Goldhaber Travel Grant, January 1998.
- Phi Beta Kappa, Reed College, Portland, OR, May 1993.
- William Einzig Memorial Scholarship, Reed College, Portland, OR, awarded 1991–92, 1992–93.
- Presidential Commendation for Academic Excellence, Reed College, Portland, OR, awarded 1991, 1992, 1993.

Invited Talks & Conferences

- Co-organizer, “*Ricci Solitons and Symmetry*”, a conference at the University of Oklahoma, March 2012; funded by the NSF and by the Research Council at OU.

- Invited speaker (lecture series on non-negatively curved manifolds), ATM Workshop TIFR Center, Bangalore, India, July 2010.
- Invited participant, “*Global Riemannian geometry*”, University of Münster, Münster, Germany, 2009.
- Organizer, “*Future directions in global Riemannian geometry*”, a conference in honor of the 60th birthday of Karsten Grove, September 2006; funded by the NSF.
- Invited participant, Workshop (Spaces of non-negative curvature), American Institute of Mathematics, Palo Alto, CA, September 2007.
- Invited speaker, Workshop on Curvature and Global Shape, University of Münster, Münster, Germany, August 2007, August 2005, August 2000.
- Invited speaker, International conference in geometry and analysis, Nanjing University, Nanjing, China, August 2007.
- Keynote speaker, TORUS (Texas–Oklahoma Regional Undergraduate Symposium), Lawton, OK, March 2008.
- Invited speaker, Annual academic colloquium, Governor’s School of Science & Math, Hartsville, South Carolina, August 2008.
- Invited speaker, Short Program in Riemannian Geometry, CRM, Montreal, Summer 2004.
- Invited speaker, Texas Geometry/Topology Conference, Feb 2004.
- AMS Sectional Meeting, Albuquerque; Special Session, *Interactions in Riemannian Geometry*, October 2007, October 2004.
- Participant at workshop, “*Global Differential Geometry*”, Mathematical Institute of Oberwolfach, Germany, June 2001.
- Invited presenter, *Tilings: Variations on a theme*, short course for undergrads, MAA Sectional Meeting (Oklahoma–Arkansas), March 2005.
- Department Colloquium at various universities: Georgia Tech; Dartmouth College; University of Waterloo, Canada; U. S. Naval Academy; University of Notre Dame; Reed College (twice), Franklin & Marshall College; Indian Institute of Technology, Mumbai, India; Chennai Mathematical Institute (thrice), Chennai, India: 1998–2004.
- Geometry/Topology seminar at various universities: University of Michigan, Ann Arbor; Columbia University, New York; University of British Columbia, Canada; UC San Diego; Michigan State Univ.; UC Santa Barbara; McMaster University, Canada; University of Pennsylvania; University of Bochum, Germany; University of Augsburg, Germany; University of Notre Dame, University of Maryland, College Park; SUNJ (Rutgers); CUNY Graduate Center, New York; University of Texas, Austin; Tata Institute of Fundamental Research, Bangalore, India: 1998–current.
- Various departmental seminars (geometry/topology, algebra, graduate student seminar, undergrad math club), University of Oklahoma, Norman, OK, 2002 — current.
- Various seminars (geometry, topology, group theory, VIGRE open problems, undergrad math club), University of Michigan, Ann Arbor, MI, 1999–2002.

Teaching Experience

- **Instructor:** Prepared lectures; wrote and graded exams, quizzes and homework; handled all administrative duties.

- *Riemannian Geometry*, Fall 2009–Spring 2010, Fall 2007–Spring 2008, University of Oklahoma (graduate course).
- *Topics in Algebra: Cryptography*, Spring 2012, 2010, 2008 & 2004, University of Oklahoma (Norman & Tulsa; undergrad and grad course).
- *Introduction to Probability & Statistics*, Fall 2009–Spring 2010, University of Oklahoma (undergrad and grad course).
- *Mathematics Capstone (Senior Seminar)*, Spring 2012 & 2007, University of Oklahoma.
- *Algebraic Topology*, Fall 2004–Spring 2005, University of Oklahoma (graduate course).
- *Combinatorics*, Fall 2005, University of Oklahoma (upper level undergrad course).
- *Intro to Partial Differential Equations*, Spring 2005, University of Oklahoma (upper level undergrad course).
- *Complex Analysis: The (Differential) Geometric Viewpoint*, Fall 2004, University of Oklahoma (upper level undergrad course).
- *Discrete Mathematics*, Fall 2003, Spring 2004, University of Oklahoma.
- *Linear Algebra*, Spring 2003, University of Oklahoma; Summer 2001, University of Augsburg, Germany.
- *Intro to Differential Equations*, Fall 2003, University of Oklahoma; Spring 2002, University of Michigan.
- *Riemannian Geometry*, Winter 2000, University of Michigan (graduate course).
- *Intro to Differentiable Manifolds*, Fall 2001, University of Michigan (graduate course).
- *Honors Abstract Algebra*, Winter 2000, University of Michigan (upper level undergraduate course).
- *Geometry and the Imagination*, Summer 2000. An intensive two week course for motivated high school kids; part of the Michigan Math Scholars Program.
- *Problem Seminar (Putnam preparation course)*, Fall 2000, Winter 2001, University of Michigan.
- *Geometry for Teachers*, Spring 2006, University of Oklahoma; Fall 2000, University of Michigan.
- *Multivariable Calculus*, Fall 2006, University of Oklahoma; Fall 2001, University of Michigan.
- *Calculus I* (Harvard style, reform calculus), Fall 1999, University of Michigan.
- *Calculus & Analytic Geometry I & II* (large lecture). Fall 2007, Fall 2010, Spring 2011.
- *Calculus and Analytic Geometry III*, Fall 2002, Spring 2006, University of Oklahoma.
- *Introduction to Probability*, Spring 1998, Fall 1995, Spring 1995, University of Maryland.
- *Elementary Statistics and Probability*, Summer 1996, University of Maryland.

- **Coordinator:**

- *Teacher training*, Fall 2000. Helped coordinate the introductory teacher training program at the University of Michigan. Responsibilities included making presentations about various aspects of teaching at Michigan as well as doing class visits to observe the new instructors.

- *Calculus II Assistant Coordinator*, Fall 2000. Helped coordinate the running of second semester calculus (35 sections) at the University of Michigan.

Synergistic & Outreach Activities

- Organizer of University of Oklahoma Math Day, a recruitment drive to attract local high school students especially from low income rural areas. Approximately 75–100 students compete in tests and a quiz show and win prizes for several events; University of Oklahoma, 2002–2007; consultant, 2009–current.
- Directed undergraduate research every semester at the University of Oklahoma. Examples of projects, "Tilings of rectangles by squares" (2002); "An application of cryptography: Playing Blackjack over the phone." (2003–04); "Conway tiling groups" (2004–05); "Continued fractions" (2006).
- Chair of the Undergraduate Program Committee, University of Oklahoma, 2010–current. The committee deals with all curricular issues regarding the teaching of mathematics, major/minor requirements, reforming the teaching of Calculus etc.
- Expository talks:
 - *Archimedes' Cattle Problem*, Keynote speaker, Texas–Oklahoma Regional Undergraduate Symposium, Lawton, OK, Spring 2008.
 - *A Mathematical Tour*, Academic colloquium, Governor's School of Science & Math, South Carolina, Summer 2008.
 - *A random walk through science*, Departmental Awards Banquet, University of Oklahoma, Spring 2005.
 - *An introduction to cryptography: Flipping coins over the phone*, East Central Oklahoma University, Spring 2004.
 - *Lucy & Lily: A game of number theory and geometry*, Reed College, Spring 2004.
- Taught a summer course, "*Geometry and the Imagination*", for the Michigan Math Scholars, a program designed to expose motivated high school kids to advanced ideas in mathematics, Summer 2000.
- Volunteer for the KCP program at the University of Michigan. This program exposes seventh graders drawn from underrepresented minority groups to higher mathematics via interaction with Michigan faculty.
- Gave an informal series of lectures, 'Applications of Knot Theory to Molecular Biology', Dept. of Molecular Biology, University of Aarhus, Denmark, 1997.

Professional Service

- Panel reviewer for National Science Foundation.
- Referee for *Inventiones Mathematicae*.
- Referee for *Duke Mathematical Journal*.
- Referee for *Bulletin of the AMS*.
- Referee for *Journal of Differential Geometry*.
- Referee for *American Journal of Mathematics*.
- Reviewer for *Mathematics Reviews* for the AMS.