

# Curriculum Vitae

## Kathryn Lesh

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### Education:

*Massachusetts Institute of Technology, 1984-88:* Ph.D., May 88, Pure Mathematics. Advisor: Prof. F. P. Peterson. Thesis: “Extensions of Maps from Suspensions of Finite Projective Spaces”  
*Churchill College, Cambridge University, 1983-84:* Master of Advanced Studies. Churchill Scholarship for one-year graduate program in mathematics (Part III of Tripos Exams).  
*Swarthmore College, 1979-83:* B.A. with Highest Honors, Mathematics and English Literature. Phi Beta Kappa, Sigma Xi, Brinkmann Mathematics Prize.

### Research Interests:

Algebraic topology: unstable homotopy theory, unstable Adams spectral sequence, unstable modules over the Steenrod algebra, the Sullivan conjecture, classifying spaces, generalized homology theories, cohomology of groups, calculus of functors, the Whitehead Conjecture.

### Experience:

*Union College, 2005- :* Professor of Mathematics.  
*Union College, 2014-2017:* Department Chair, Mathematics.  
*MIT, 2004-05:* Research Affiliate, on sabbatical from Union College.  
*Union College, 2002-2005:* Associate Professor of Mathematics.  
*Union College, 2001-2002:* Assistant Professor of Mathematics.  
*University of Toledo, 1996-2003:* Associate Professor of Mathematics (with tenure). From Jan 2000 - Aug 2001, undergraduate academic advisor and coordinator of Math Learning Center.  
*MIT, 1997-98:* Visiting Scholar, on sabbatical from the University of Toledo.  
*University of Toledo, 1991-96:* Assistant Professor of Mathematics.  
*Brandeis University, 1988-1991:* Assistant Professor of Mathematics.  
*Mathematical Sciences Research Institute, Fall, 1989 :* Postdoctoral Fellow.  
*Massachusetts Institute of Technology, 1984-1988:* T.A.—lectures and recitations.

### Courses Taught:

*Lower division:* developmental algebra, problem solving for liberal arts, mathematics for elementary education, precalculus, trigonometry, business calculus, cryptology.  
*Calculus:* all levels of calculus and linear algebra.  
*Upper division:* abstract algebra (both junior level and senior level), topology, geometry, transition to higher math (“how-to-prove-it”), cryptology, real analysis, senior thesis.  
*Graduate courses:* real analysis, applied linear algebra, topology, pedagogy seminar for TAs.  
*Methodologies used:* lecture, seminar, lecture/seminar hybrid, project-based, historical sources, technology, student presentations, Geometer’s Sketchpad software, WeBWorK.

### Refereed Publications:

- (1) “Fixed points of coisotropic subgroups” with Gregory Arone.  
To appear in *Homology, Homotopy, and Applications (2020)*
- (2) “Classification of problematic subgroups of  $U(n)$ ”  
with J. Bergner, R. Joachimi, V. Stojanoska, and K. Wickelgren.  
*Trans. Amer. Math. Soc.*, 371, 6739-6777 (2019).
- (3) “Bredon Homology of Partition Complexes” with Gregory Arone and William Dwyer  
*Doc. Math.* 21, 1227-1268 (2016).
- (4) “Fixed points of  $p$ -toral groups acting on partition complexes”  
with J. Bergner, R. Joachimi, V. Stojanoska, and K. Wickelgren.  
Women in topology: collaborations in homotopy theory, 83–96, *Contemp. Math.*, 641, Amer. Math. Soc., Providence, RI, 2015.
- (5) “Augmented  $\Gamma$ -spaces, the stable rank filtration, and a  $bu$  analogue of the Whitehead conjecture,”  
with Gregory Arone, *Fundamenta Mathematicae*, 207 (2010), no. 1, 29–70.
- (6) “Loop structures in Taylor towers,” with Gregory Arone and William Dwyer  
*Algebraic and Geometric Topology*, 8, 173-210 (2008).
- (7) “Filtered spectra arising from permutative categories,” with Gregory Arone  
*Journal für die reine und angewandte Mathematik (Crelle’s Journal)*, 604, 73-136 (2007).
- (8) “Cohomology of symmetric groups and the Quillen map at odd primes,” with Le Minh Ha  
*Journal of Pure and Applied Algebra*, 190, 137-153 (2004).
- (9) “A conjecture on the unstable Adams spectral sequences for  $SO$  and  $U$ ”  
*Fundamenta Mathematicae*, 174, 49-78 (2002).
- (10) “The unstable Adams spectral sequence for two-stage towers”  
*Topology Appl.*, 101, 161-180 (2000).
- (11) “A filtration of spectra arising from families of subgroups of symmetric groups”  
*Trans. Amer. Math. Soc.*, 352, 3211-3237 (2000).
- (12) “Infinite loop spaces from group theory”  
*Mathematische Zeitschrift*, 225, 467-483 (1997).
- (13) “Hybrid spaces with interesting cohomology”  
*Trans. Amer. Math. Soc.*, 347, 3247-3262 (1995).
- (14) “Extensions of maps from suspensions of finite projective spaces”  
*Mathematische Zeitschrift*, 205, 437-450 (1990).

### Submitted preprints:

- (15) “ $p$ -toral approximations compute Bredon homology” with Gregory Arone and William Dwyer.  
*Submitted to peer-reviewed journal January 2019*

### Other Publications:

- (16) “Mathematical Problem Solving and Heuristics”  
*NLA News*, March, 1990.

### Grants and Awards since 2005:

- (1) National Science Foundation, spring 2010:  
\$159,714 three-year grant for “FRG: Collaborative Research: The Calculus of Functors and the Theory of Operads: Interactions and Applications”
- (2) National Science Foundation, spring 2009:  
\$22,500 grant for “Conference Travel Funding: Algebraic Topology, Group Theory, and Rep-

resentation Theory (Isle of Skye),” to support participants at an international conference for which I was a co-organizer.

(3) National Science Foundation, spring 2005:

\$19,000 Research Opportunity Award to support joint research with Gregory Arone at the University of Virginia.

### Conference organizing:

- (1) Skye 2009: International conference on algebraic topology, group theory, and representation theory (Organizing committee)
- (2) AMS Special Session 2008: Fall AMS Sectional Meeting on algebraic topology, in honor of Bill Singer (Co-organizer)
- (3) INGO 2003: International conference on invariant theory. (Scientific committee)
- (4) Co-organizer of Union College Mathematics Conference 2001, 2003, 2005, 2013.

### Invited talks since 2005:

(expenses and/or honorarium provided where indicated)

- (1) *Massachusetts Institute of Technology, March, 2005*: Research seminar. Supported
- (2) *University of Delaware, April 2005*: AMS regional meeting special session.
- (3) *Northwestern University, April 2005*: Research seminar. Supported
- (4) *University of Chicago, April 2005*: Research seminar. Supported
  
- (5) *Vassar College, 2006*: Research seminar.
  
- (6) *University of Chicago, 2007*: Research seminar. Supported
- (7) *University of Paris 13, Villeneuve, France, October 2007*: Research seminar.
  
- (8) *University of Virginia, April, 2008*: Undergraduate Math Seminar Supported
- (9) *Lisbon Technical Institute, July, 2008*: Topology Seminar.
- (10) *University of Oregon, December 2008*: Research seminar. Supported
  
- (11) *Ecole Polytechnique Fédéral de Lausanne, August 2009*: Research seminar. Supported
  
- (12) *Smith College, December 2011*: Undergraduate seminar Supported
  
- (13) *Boston, MA, Jan 2012*: AMS national meeting special session.
- (14) *Wesleyan University, April, 2012*: Research seminar. Supported
- (15) *Virginia Conference on Algebraic Topology, June 2012*:  
International conference, plenary speaker. Supported
- (16) *Fourth Arolla Conference on Algebraic Topology, August 2012*:  
International conference, plenary speaker. Supported
  
- (17) *Midwest Topology Seminar, February 2013, UIUC* :  
Regional conference, plenary speaker Supported
  
- (18) “*Manifolds, K-theory, and related topics,*” *Croatia, June, 2014*.  
International conference, invited speaker. Supported

- (19) *Stockholm University, March, 2016.*  
Topology seminar, invited speaker. Supported
- (20) *Fields Institute, Toronto, June, 2016.*  
Workshop on Group Actions, invited speaker. Supported
- (21) *Hiroshima, Japan, November, 2016.*  
Symposium on Homotopy Theory, invited speaker. Supported
- (22) *Osaka University, Japan, November, 2016.*  
Workshop, invited speaker. Supported
- (23) *Himeji, Japan, November, 2016.*  
Symposium on Group Action, invited speaker. Supported
- (24) *Stockholm University, December, 2016.*  
Topology seminar, invited speaker. Supported
- (25) *Homotopy Theory Conference, UIUC, July, 2017.*  
International conference, invited speaker. Supported
- (26) *Galapagos Islands, Ecuador, August, 2017.*  
Topology Ecuador 2017, international conference, invited speaker.
- (27) *Massachusetts Institute of Technology, February, 2019:*  
Topology research seminar, invited speaker. Supported
- (28) *AWM Research Symposium, Rice University, April, 2019:*  
National conference, invited speaker.
- (28) *Equivariant Topology & Derived Algebra Conference, Trondheim, July, 2019:*  
International conference, invited speaker. Supported
- (29) *SUNY Albany, September, 2019:*  
Topology research seminar, invited speaker.

Supported workshop attendance

- Clay Mathematics Institute, March 11-13, 2005. Supported
- Mittag-Leffler Institute, Stockholm, Winter 2006. One month research fellowship. Supported
- University of Copenhagen, June 15-20, 2008 Supported
- Banff International Research Station, March 2011. Supported
- University of Edinburgh, April 2011 Supported
- Banff International Research Station, August 2013, team co-leader. Supported
- Mathematical Sciences Research Institute, March 2014. Supported
- Fields Institute, Toronto, June 2016. Supported
- UC Boulder, "Chromatic Homotopy Theory Conference," May 2018 Supported
- Conference on Manifolds, Groups, and Homotopy, Scotland, June 2018 Supported
- Isaac Newton Institute (Cambridge UK) program  
"Homotopy harnessing higher structures," four weeks in 2018 Supported