

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, WeBWorK, flipped classroom.

Refereed Publications:

- (1) “The rank filtration via a filtered bar construction,” with Gregory Arone
To appear in *Algebraic and Geometric Topology*
- (2) “ p -toral approximations compute Bredon homology”
with Gregory Arone and William Dwyer
International Mathematics Research Notices vol. 2021(5), 3822-3865 (2021).
- (3) “Fixed points of coisotropic subgroups,” with Gregory Arone
Homology, Homotopy, and Applications vol. 22(1)(2020), p.77–96.
- (4) “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).
- (5) “Bredon Homology of Partition Complexes” with Gregory Arone and William Dwyer
Doc. Math. 21, 1227-1268 (2016).
- (6) “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.
- (7) “Augmented Γ -spaces, the stable rank filtration, and a bu analogue of the Whitehead conjecture,”
with Gregory Arone, *Fundamenta Mathematicae*, 207 (2010), no. 1, 29–70.
- (8) “Loop structures in Taylor towers,” with Gregory Arone and William Dwyer
Algebraic and Geometric Topology, 8, 173-210 (2008).
- (9) “Filtered spectra arising from permutative categories,” with Gregory Arone
Journal für die reine und angewandte Mathematik (Crelle’s Journal), 604, 73-136 (2007).
- (10) “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).
- (11) “A conjecture on the unstable Adams spectral sequences for SO and U ”
Fundamenta Mathematicae, 174, 49-78 (2002).
- (12) “The unstable Adams spectral sequence for two-stage towers”
Topology Appl., 101, 161-180 (2000).
- (13) “A filtration of spectra arising from families of subgroups of symmetric groups”
Trans. Amer. Math. Soc., 352, 3211-3237 (2000).
- (14) “Infinite loop spaces from group theory”
Mathematische Zeitschrift, 225, 467-483 (1997).
- (15) “Hybrid spaces with interesting cohomology”
Trans. Amer. Math. Soc., 347, 3247-3262 (1995).
- (16) “Extensions of maps from suspensions of finite projective spaces”
Mathematische Zeitschrift, 205, 437-450 (1990).

Preprints:

- (17) “A new approach to mod 2 decompositions of $BSU(2)$ and $BSO(3)$ ”
with E. Belmont, N. Castellana, J. Grbić, and M. Strumilla.
- (18) “Normalizers of chains of discrete p -toral subgroups in compact Lie groups”
with E. Belmont, N. Castellana, J. Grbić, and M. Strumilla.

Other Publications:

- (18) “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 Representation 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 2007:

(expenses and/or honorarium provided where indicated)

- (1) *University of Chicago, 2007*: Research seminar. Supported
- (2) *University of Paris 13, Villeneuve, France, October 2007*: Research seminar.
- (3) *University of Virginia, April, 2008*: Undergraduate Math Seminar Supported
- (4) *Lisbon Technical Institute, July, 2008*: Topology Seminar.
- (5) *University of Oregon, December 2008*: Research seminar. Supported
- (6) *Ecole Polytechnique Fédéral de Lausanne, August 2009*: Research seminar. Supported
- (7) *Smith College, December 2011*: Undergraduate seminar Supported
- (8) *Boston, MA, Jan 2012*: AMS national meeting special session.
- (9) *Wesleyan University, April, 2012*: Research seminar. Supported
- (10) *Virginia Conference on Algebraic Topology, June 2012*:
International conference, plenary speaker. Supported
- (11) *Fourth Arolla Conference on Algebraic Topology, August 2012*:
International conference, plenary speaker. Supported
- (12) *Midwest Topology Seminar, February 2013, UIUC* :
Regional conference, plenary speaker Supported
- (13) *“Manifolds, K-theory, and related topics,” Croatia, June, 2014*.
International conference, invited speaker. Supported
- (14) *Stockholm University, March, 2016*.
Topology seminar, invited speaker. Supported

- (15) *Fields Institute, Toronto, June, 2016.*
Workshop on Group Actions, invited speaker. Supported
- (16) *Hiroshima, Japan, November, 2016.*
Symposium on Homotopy Theory, invited speaker. Supported
- (17) *Osaka University, Japan, November, 2016.*
Workshop, invited speaker. Supported
- (18) *Himeji, Japan, November, 2016.*
Symposium on Group Action, invited speaker. Supported
- (19) *Stockholm University, December, 2016.*
Topology seminar, invited speaker. Supported
- (20) *Homotopy Theory Conference, UIUC, July, 2017.*
International conference, invited speaker. Supported
- (21) *Galapagos Islands, Ecuador, August, 2017.*
Topology Ecuador 2017, international conference, invited speaker.
- (22) *Massachusetts Institute of Technology, February, 2019:*
Topology research seminar, invited speaker. Supported
- (23) *AWM Research Symposium, Rice University, April, 2019:*
National conference, invited speaker.
- (24) *Equivariant Topology & Derived Algebra Conference, Trondheim, July, 2019:*
International conference, invited speaker. Supported
- (25) *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
- Hausdorff Institute, Bonn, Women in Topology program 2019
Team co-leader Supported