Curriculum Vita (short form) of
Sean Allen Broughton

Professor Emeritus, Department of Mathematics
Rose-Hulman Institute of Technology

compiled December 30, 2024

1 Personal Information, Education, and Professional Experience

1.1 Personal and Contact Information

Date of Birth:	November 12, 1951, Windsor, Ontario, Canada.
Address:	6 Lenox Dr., Shrewsbury, MA, 01545
Email:	mailto:brought@rose-hulman.edu
Websites	
Emeritus Website:	https://askthedoctorofmath.com/
Tilings of Surfaces Website:	https://tilings.org/
Autosurf Website:	https://www.rose-hulman.edu/mapub/autosurf/home.html

1.2 Education

B.Sc. (1975)	University of Windsor, Ontario, Canada, 1971-73 &1974-1975
	Major in mathematics, minor in physics
M.Sc. (1978)	Queen's University, Kingston, Ontario, 1975-78
	Supervisor: O. A. Nielsen
	Thesis Title: *The fundamental groups and centres of Lie groups*
Ph.D. (1982)	Queen's University, 1978-82
	Supervisor: A. J. Coleman
	Thesis Title: *On the topology of polynomial hypersurfaces*
Languages	Some fluency in spoken and written French
	Reading knowledge of German

1.3 Work Experience (reverse chronological order)

2017-present	Professor Emeritus of Mathematics, Rose-Hulman Institute of Technology
2017-present	Mathematical and Digital Consultant, two not-for-profit organizations
2014-17	Professor of Mathematics, Rose-Hulman Institute of Technology
1994-2014	Professor and Head of Mathematics, Rose-Hulman Institute of Technology
1989-94	Associate Professor, Mathematics, Cleveland State University,
1986-89	Assistant Professor, Mathematics, Cleveland State University
1983-86	Van Vleck Visiting Assistant Professor, Mathematics,
	University of Wisconsin-Madison, (half-time, 9-83 to 9-85
	while NSERC Postdoctoral Fellowship (Canada) concurrently held)
1981-83	Assistant Professor, Mathematics, Memorial University of
	Newfoundland
1975-80	Grader, Teaching Assistant, and Lecturer while a graduate student
	at Queen's University
1974-75	Sublieutenant, Canadian Armed Forces
1971-73, 74-75	Grader and Teaching Assistant, Mathematics, University of Windsor

1.4   Scholarships and Fellowships

1977-78 and 1979-80	Ontario Graduate Scholarship,
1980-81	Queen's University Scholarship,
1983-85	Natural Sciences and Engineering Research Council Postdoctoral Fellowship (Canada)

1.5   Grants Awarded

1986-87	Research Challenge Grant, Ohio Board of Regents, $5000
1993	Mathematical Sciences Computing Laboratory, Internal House Bill 904, Cleveland State University, $100,000, drafted proposal
1997	Computational Group Theory and Hyperbolic Geometry, NSF-REU, DMS-9619714, $30,000, P.I.
1997	Foundation Coalition Upper Division Curriculum Proposal, $8,000, co-P.I.
1998-2001	Computational Group Theory and Hyperbolic Geometry, NSF-REU, DMS-9619714 (extension), $120,000, P.I.
2001-2003	Computational Group Theory, Hyperbolic Geometry, Number Theory, and Inverse problems NSF-REU, DMS-0097804, $144,000, P.I
2003-2004	Sophomore Course and Ancillaries in Nanoscience DMR-0304487 $100,000 senior investigator
2003-2004	MAA Conference Grant supported by NSF DMS-0241090, $2,000
2006-2007	MAA Conference Grant supported by NSF DMS-0536991, $2,000
2014-2017	Rose Summer Undergraduate Research Program - grant administrator, $60,000

1.6   Other Professional Activities

Summer 1983	NSERC Research Experiences for Undergraduates, Memorial U. of Newfoundland
1990-1994	reviewer, Mathematical Reviews
Summer 1992	participant, Regional Geometry Institute, Amherst, Massachusetts
Summer 1993	participant, ATLAST Linear Algebra Curriculum Workshop, U. of Michigan
March 1994	visiting scholar, Universidad Naccional de Educaccion a Distancia, Madrid Spain
Summer 1996	SIAM Workshop: Mathematics of Finance
Summer 1996	consultant, Rose-Hulman NSF-REU
1996-2017	Member, Imaging Systems Faculty, RHIT
1997-2004	program director, Rose-Hulman NSF-REU
September 1999	participant, Working Conference on Undergraduate Mathematics Research, Washington, D.C.
Winter 2000-01	TED Program Rose-Hulman
Spring 2001-02	Sabbatical, Mount Holyoke College
Spring 2007	Session on Automorphisms of Surfaces, U. of Arizona, Tucson, co-organizer
Spring 2007-08	Sabbatical, Indiana University
Spring 2007-08	visiting scholar, Universidad Naccional de Educaccion a Distancia, Madrid Spain
Fall 2009	Session on Automorphisms of Surfaces, Penn State, co-organizer

Summer 2011	MAA PREP Workshop, Biomathematics - beyond Calculus, Sweet Briar College, participant
Winter 2012	MAA Joint Meetings Minicourse - Computational Discrete Geometry, Boston, participant
Winter 2013	MAA Joint Meetings Minicourse - Using Webwork, San Diego, participant
Summer 2013	Riemann and Klein Surfaces, Symmetries and Moduli Spaces, Linköping Sweden Member of Scientific Committee and Proceedings Associate Editor
Winter 2015	AMS Joint Meetings Short Course - Finite Frame Theory, participant
Fall 2015	Session on Automorphisms of Surfaces, Loyola University, co-organizer
Spring 2016	Sabbatical, Linköping University, Sweden and UNED, Madrid, Spain
Fall 2017	Symmetries of Surfaces, Maps and Dessins - BIRS - workshop leader
Spring 2018	Session on Automorphisms of Surfaces, Portland State University, co-organizer
2020-2021	Contemporary Mathematics volume 776, co-editor
Spring 2022	Session on Automorphisms of Riemann Surfaces ..., virtual AMS meeting, co-organizer
Spring 2024	Session on Automorphisms of Riemann Surfaces ..., U. of W. - Milwaukee, co-organizer

1.7 Professional Societies

1986-present	member, AMS, American Mathematical Society
1986-2018	member, MAA, Mathematical Association of America
1994-present	member, SIAM, Society for the Industrial Applications of Mathematics

1.8 Public Service and Volunteer Activities

1993	member, Technology Task Force, South Euclid - Lyndhurst School District
1992-94	member, Adrian School PTA and Advisory Council
1997-02	den leader and Assistant Scout Master, Boy Scouts of America
2011-17	Terre Foods Cooperative, Recruiting and Communications Committees
2018-19	Southgate at Shrewsbury, Resident Council - committee member
2018-present	Massachusetts Life Care Residents' Association - Board member and digital consultant
2018-present	Community Harvest Project - Volunteer farming for hunger relief
2021-2024	Westbrook Crossing Board of Trustees - Treasurer, Chair, Digital Consultant - 73 condo unit

2 Teaching Experience

2.1 Undergraduate Courses Taught

- College Algebra, Liberal Arts Mathematics, Mathematics for Teachers
- Basic and Pascal Programming
- all levels of Calculus
- Linear Algebra, Differential Equations, Statistics
- Discrete Mathematics, Probability
- Mathematical Modeling
- Euclidean, Non-Euclidean, and Differential Geometry
- Mathematics of Image Processing.
- Introduction to Parallel Computing
- Fractals and Chaotic Systems
- Lie Groups and Lie Algebras

2.2 Graduate Courses Taught

- Applied Linear Algebra
- Stochastic Methods of Operations Research
- Euclidean and Non-Euclidean Geometry
- Fractals and Chaotic Systems
- Lie Groups and Lie Algebras
- Algebraic Geometry

2.3 Graduate Student Committees

Dave Boyles	University of Wisconsin
Steve Katz	University of Wisconsin
Kay Tasuoka	University of Wisconsin
Jack Chen	Cleveland State
Todd Holthaus	Rose-Hulman
Madhulika Khare	Rose-Hulman
Siva Subramanian	Rose-Hulman
Sundershan Tirumala	Rose-Hulman
Christopher Doyle	Rose-Hulman
Lei Liu	Rose-Hulman

2.4   Undergraduate Theses and Projects

| Robert Parada | Gauge Theory |
| Jackie Preston | Logistic Regression and NFL superbowl Data |

3 Research Interests and Computing Activities

3.1 Research Interests

- Riemann surfaces, non-Euclidean geometry, automorphisms, tilings, group actions, moduli and Teichmüller spaces

- Lie theory, geometry and topology of manifolds and homogeneous spaces

- singularity theory, algebraic geometry

- mathematics of image and signal processing, wavelets and frames

3.2 Computing Software and Systems

- *Computer Algebra Systems:* MAPLE, MATLAB, MAGMA, MACAULAY, GAP, MATHEMATICA

- *Programming Languages:* Python, C, FORTRAN, BASIC, PASCAL

- *Other:* TeX, standard Microsoft productivity tools, HTML, PHP, Constant Contact, Google Workspace

3.3 Computing Experience and Activities

- Extensive classroom use at Cleveland State and Rose-Hulman

- Extensive research use at Cleveland State, Rose-Hulman, and as Emeritus Professor

- Support and leadership for computer use at Cleveland State and Rose-Hulman

- Chair, Academic Software Committee, Rose-Hulman

- Equipment grant writing at Cleveland State and Rose-Hulman

- Webmaster and web site developer, RHIT Mathematics Department until August, 2014

- WeBWorK administrator, RHIT Mathematics Department

- Chair of Parallel Computing Steering Committee/Users Group

- Volunteer: Constant Contact email support for Terre Foods

- Volunteer/consultant: Webmaster, Digital Office administration (Google Workspace) and Constant Contact email support for Massachusetts Life Care Residents' Association

- Volunteer-Trustee: Digital Office administration (Google Workspace) Westbrook Crossing Trust

4 Publications, Works in Progress, and Presentations

For complete documentation and downloads of some works visit my BEpress Selected Works website:

4.1 Theses

T1. *The fundamental groups and centres of Lie groups*, Queen's University, M.Sc. Thesis, 1978.

T2. *On the topology of polynomial hypersurfaces*, Queen's University, Ph.D. Thesis, 1982.

4.2 Books and Book Chapters

B1. *The Science of Nanotechnology: An Introductory Text,* with L. Tilstra, R. Tanke, D. Jelski, V. French, G. Zhang, A. Popov, T. George, and A. Western, Nova Science Publishers, Hauppauge NY (2007).

B2. *Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing*, with Kurt Bryan, Wiley Interscience (2009).

B3. *Riemann and Klein Surfaces, Automorphisms, Symmetries and Moduli Spaces*, editors: M. Izquierdo, S.A. Broughton, A.F. Costa, R.E. Rodríguez, AMS Contemporary Mathematics #629 (2014).

B4. *Discrete Fourier Analysis and Wavelets: Applications to Signal and Image Processing, Edition 2* , with Kurt Bryan, Wiley (2018).

B5. *Automorphisms of Riemann Surfaces, Subgroups of Mapping Class Groups and Related Topics*, editors: A. Wootton, A. Broughton, J. Paulhus, AMS Contemporary Mathematics #776 (2022).

4.3 Published / Accepted Papers

P1. *A comment on unions of sigma-fields,* with B.W. Huff, Amer. Math. Monthly, **84** (7) (1977), 553-554.

P2. *On the topology of polynomial hypersurfaces,* Proc. Symposia Pure Math., **40,** Amer. Math. Soc. (1983), 167-178.

P3. *The height of two-dimensional cohomology classes of complex flag manifolds,* with M. Hoffman and W. Homer, Canadian Bull. Math. **26** (4) (1983), 498-502.

P4. *A note on characters of algebraic groups*, Proc. of the AMS **89** (1) (1983), 39-40.

P5. *The homology and higher representations of the automorphism group of a Riemann surface,* Transactions AMS **300** (1) (1987), 153-158.

P6. *Volumes of subgroups of compact Lie groups,* Algebras, Groups and Geometries, **4** (1987), 325-364.

P7. *Milnor numbers and the topology of polynomial hypersurfaces,* Invent. Math., **92** (1988), 217-241.

P8. *The equisymmetric stratification of the moduli space and the Krull dimension of the mapping class group,* Topology and its Applications, **37** (1990), 101-113.

P9. *Classifying finite group actions on surfaces of low genus,* J. of Pure & Appl. Algebra, **69** (1990), 233-270.

P10. *The Gottlieb group of finite linear quotients of odd-dimensional spheres,* Proc. of the A.M.S., **111** (4) (1991), 1195-1197.

P11. *Normalizers and centralizers of elementary Abelian subgroups of the mapping class group,* Topology '90, Walter de Gruyter, New York (1992), 77-89.

P12. *Simple group actions on hyperbolic surfaces of least area,* Pacific J. of Math., **158** (1) (1993), 23-48.

P13. *Symmetries of Riemann surfaces on which $PSL(2, q)$ acts as a Hurwitz automorphism group,* with E. Bujalance, A.F. Costa, J.M. Gamboa, and G. Gromadski, J. of Pure and Appl. Algebra. **106** (1996), 113-126, `https://www.sciencedirect.com/science/article/pii/0022404994000654`.

P14. *Symmetries of Accola - Maclachlan and Kulkarni surfaces,* with E. Bujalance, A.F. Costa, J.M. Gamboa, and G. Gromadski, Proc. of the AMS. **127** #3 (1999), 637-646, `https://www.jstor.org/stable/118994`.

P15. *Constructing Kaleidoscopic Tiling Polygons in the Hyperbolic Plane*, American Mathematical Monthly, **107** #8 (2000), 689-710, `https://www.jstor.org/stable/2695467`.

P16. *Divisible tilings of the hyperbolic plane,* with D.M. Haney, L. McKeough and B. Smith, New York Journal of Mathematics, **6** (2000), 237-283, `http://nyjm.albany.edu:8000/j/2000/6-12.pdf`.

P17. *Anharmonic Vibrational Motions in C60 : A Potential Energy Surface Derived from Vibrational Self Consistent Field Calculations*, with Daniel Jelski and Laszlo Nemes, Journal of Cluster Science, **16** (1) (2005).

P18. *Finite Abelian Subgroups of the Mapping Class Group*, with Aaron Wootton, Algebraic & Geometric Topology, **7** (2007), 1651–1697. `http://msp.warwick.ac.uk/agt/2007/07/p066.xhtml`.

P19. *Topologically Unique Maximal Elementary Abelian Group Actions on Compact Oriented Surfaces*, with Aaron Wootton, Journal of Pure and Applied Algebra, **213** (2009), 557-572, https://www.sciencedirect.com/science/article/pii/S0022404908001692.

P20. *Cyclic n-gonal surfaces and their automorphism groups: two talks in the UNED Geometry Seminar*, with Aaron Wootton, Disertaciones del Seminario de Matematicas Fundamentales, no. 44, UNED, https://arxiv.org/abs/1003.3262.

P21. *Ellipses in Translation Surfaces*, with Chris Judge, Geometriae Dedicata, (2012), 1-41, https://doi.org/10.1007/s10711-011-9602-3.

P22. *Superelliptic surfaces as p-gonal surfaces*, Riemann and Klein Surfaces, Automorphisms, Symmetries and Moduli Spaces, Contemporary Mathematics Series #629, Amer Math Soc (2014), 15-28, http://www.ams.org/books/conm/629/.

P23. *Exceptional automorphisms of (generalized) super elliptic surfaces*, with Aaron Wootton, Riemann and Klein Surfaces, Automorphisms, Symmetries and Moduli Spaces, Contemporary Mathematics Series #629, Amer Math Soc (2014), 29-42, http://www.ams.org/books/conm/629/.

P24. *Quasi-platonic PSL(2,q)-actions on closed Riemann surfaces,* Albanian Journal of Mathematics **9** (1), (2015), 31-61, http://albanian-j-math.com/archives/2015-02.pdf.

P25. *Using Strong Branching to Find Automorphisms of n-gonal Surfaces,* with C. Camacho, J. Paulhus, R. Winarski, and A. Wootton, Albanian Journal of Mathematics **12** (1), (2019), 89-129, https://albanian-j-math.com/archives/2018-08.pdf.

P26. *Galois action on regular dessins d'enfant with simple group action*, Higher Genus Curves in Mathematical Physics and Arithmetic Geometry, Contemporary Mathematics Series #703, Amer Math Soc (2018), 13-32, http://www.ams.org/books/conm/703/.

P27. *On Automorphisms of Algebraic Curves*, with T. Shaska and A. Wootton, Algebraic Curves and Their Applications, Contemporary Mathematics Series #724, Amer Math Soc (2019), https://www.ams.org/books/conm/724/.

P28. *The engaging symmetry of Riemann surfaces: A historical perspective*, with Gareth A. Jones and David Singerman, Automorphisms of Riemann surfaces, subgroups of mapping class groups and related topics, Contemporary Mathematics Series #776, Amer Math Soc (2022), https://www.ams.org/books/conm/776/.

P29. *Future directions in automorphisms of surfaces, graphs, and other related topics*, with Jennifer Paulhus and Aaron Wootton, Automorphisms of Riemann surfaces, subgroups of mapping class groups and related topics, Contemporary Mathematics Series #776, Amer Math Soc (2022), https://www.ams.org/books/conm/776/.

P30. *Equivalence of finite group actions on Riemann surfaces and algebraic curves*, Automorphisms of Riemann surfaces, subgroups of mapping class groups and related topics, Contemporary Mathematics Series #776, Amer Math Soc (2022), https://www.ams.org/books/conm/776/.

P31. *One dimensional equisymmetric strata in moduli space*, with Antonio F. Costa and Milagros Izquierdo, Automorphisms of Riemann surfaces, subgroups of mapping class groups and related topics, Contemporary Mathematics Series #776, Amer Math Soc (2022), https://www.ams.org/books/conm/776/.

P32. *TRIANGULATIONS OF UNORIENTABLE SURFACES*, with Eduardo Brandani da Silva, Albanian J. Math. 17 (2) 105 - 142, (2023), https://doi.org/10.51286/albjm/1702292327

P33. *One dimensional equisymmetric strata in moduli space with genus 1 quotient surfaces*, with Antonio F. Costa and Milagros Izquierdo, Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas Volume **118**, article no 21, (2024)

4.4   Technical Reports and Preprints

TR1. *Symmetries of Accola-MacLachlan and Kulkarni Surfaces,* with E. Bujalance, A F. Costa, J.M. Gamboa, and G. Gromadzki, RHIT MSTR 95-05, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/64/.

TR2. *Counting Ovals on a Symmetric Riemann Surface,* RHIT MSTR 97-04, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/68/.

TR3. *Constructing Kaleidscopic Tiling Polygons in the Hyperbolic Plane*, RHIT MSTR 98-06, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/112/.

TR4. *Divisible Tilings in the Hyperbolic Plane*, with Dawn M. Haney, Lori T. McKeough, and Brandy M. Smith, MSTR 99-04, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/60/.

TR5. *Splitting tiled surfaces with abelian conformal tiling group,* RHIT MSTR 99-03, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/58/.

TR6. *Triangular Surface Tiling Groups for Low Genus*: with Robert M. Dirks, Maria T. Sloughter, and C. Ryan Vinroot, RHIT MSTR 01-01, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/55/.

TR7. *The Birational Isomorphism Types of Smooth Real Elliptic Curves,* RHIT MSTR 04-05, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/44/.

TR8. *The Barycenter of the Numerical Range of a Matrix,* with Roger Lautzenheiser and Thomas Werne, RHIT MSTR 07-04, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/39/.

TR9. *Flattening a Cone*, RHIT MSTR 09-01, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/16/.

TR10. *Calculation of the Killing Form of a Simple Lie Group*, RHIT MSTR 14-01, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/38/.

TR11. *Analytical Solution of the Symmetric Circulant Tridiagonal Linear System,* with J.J. Leader, RHIT MSTR 14-02, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/103/.

TR12. *Continuous Dependence of Solutions of Equations on Parameters*, RHIT MSTR 14-03, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/107/.

TR13. *Quasi-platonic $PSL2(q)$-actions on closed Riemann surfaces,* RHIT MSTR 15-01, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/151/.

TR14. *Topological and H^q Equivalence of Prime Cyclic p-gonal Actions on Riemann Surfaces (Corrected),* RHIT MSTR 16-03, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/155/.

TR15. *Branching Matrices for the Automorphism Group Lattice of a Riemann Surface,* RHIT MSTR 18-01, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/167/.

TR16. *Topological and H^q Equivalence of Cyclic n-gonal Actions on Riemann Surfaces - Part II,* RHIT MSTR 20-03, Rose-Hulman Math. Sci.Tech. Report Series, https://scholar.rose-hulman.edu/math_mstr/175/.

4.5   Conference Proceedings (not refereed)

C1. *Mean and standard deviation for the facilities design problem,* with V. Charumongkol, Computers in Industrial Engineering, **19**, Nos. 1-4 (1990) 313-317.

C2. *The role of technology in enhancing learning in various disciplines*, with Sam Hulbert, Julia Williams, and Ed Doering, IHETS Purdue Conference on Technology Enhancement and Teaching and Learning.

C3. *The Rose-Hulman NSF-REU Program, in* Working Conference on Summer Undergraduate Mathematics Research, Washington, D.C. 1999, AMS (2000) 139-145.

4.6   Unpublished Manuscripts and Notes

U1. *Maximal finite groups of homeomorphisms of Riemann surfaces.*

U2. *Algebraic geometry, elimination theory and factorization in exterior algebra:* notes for the Cleveland Topology Seminar.

U3. *Symmetries of Riemann surfaces and kaleidoscopic tilings:* notes for presentation at RHIT.

U4. *Kaleidoscopic tilings of Riemann surfaces:* problems for the RHIT - REU.

4.7   Work in Progress

W1. *Modular companions in planar one-dimensional equisymmetric strata*, with Antonio Costa and Milagros Izquierdo, in preparation.

W2. *Explicit Homology Representation for Groups Acting on Surfaces*, with Linden Disney-Hogg, in preparation.

W3. *The mirrors on a symmetric Riemann surface with quasi-platonic PSL2(q)-action*, in preparation.

W4. *Full Automorphism Groups of Cyclic n-gonal Surfaces,* with Aaron Wootton, in preparation.

W5. *Classification of Primitive Fuchsian Group Pairs,* in preparation.

4.8   Presentations

1. *The topology of polynomial hypersurfaces,* AMS Summer School on Singularity Theory, Arcata, California, August 1981, contributed talk.

2. *Milnor numbers and the topology of polynomial hypersurfaces*, Topology Seminar, Ohio State University, May 1984, invited lecture.

3. *The homology representation of the automorphism group of a Riemann surface,* Case-Carroll Seminar, John Carroll University, November 1986, invited lecture.

4. *The interplay between topology and singularity theory in algebraic geometry*, Case-Carroll Seminar, John Carroll University, November 1987, invited lecture.

5. *Simple groups of automorphisms of Riemann surfaces,* Mathematics Department Colloquium, Kent State University, February 1988, invited lecture; Valley Geometry Seminar, Five Colleges Inc., February 1988, invited lecture.

6. *The equisymmetric stratification of the moduli space*, AMS special session on knot theory and algebraic geometry in the large, Amer. Math. Soc. meeting, College of the Holy Cross, April 1989, invited talk.

7. *Fractal geometry: geometry, probability and computers yield pretty pictures*, Second Annual Sonya Kovalevsky High School Mathematics Day, Cleveland State University, November 1990, invited presentation.

8. *Group symmetries and partial differential equations*, Cleveland Topology Seminar, Winter-Spring 1990, 6 contributed lectures.

9. *Stratification of families of affine curves by the link at infinity*, AMS special session on affine hypersurfaces, and related number theory, Amer. Math. Soc. meeting, Dayton, Ohio, October 1992, invited talk.

10. *Algebraic geometry, elimination theory and factorization in exterior algebras*, Cleveland Topology Seminar, Fall -Winter 1992-93, 4 contributed lectures.

11. *The equisymmetric stratification of the moduli space of Riemann surfaces*, Universidad Naccional de Educaccion a Distancia, Madrid, March 1994, invited lecture.

12. *Computing the finite group actions on Riemann surfaces in low genus,* Universidad Naccional de Educaccion a Distancia, Madrid, March 1994, invited lecture.

13. *Symmetries of Riemann surfaces and kaleidoscopic tilings*, Rose-Hulman, January 1994, interview presentation.

14. *Lectures on wavelets*, RHIT Applied Math Seminar, Winter 1995, 4-5 contributed lectures.

15. *Tilings, finite groups, and hyperbolic geometry at the Rose-Hulman REU*, MAA Fall meeting, Wabash College, October 1997, contributed talk.

16. *The role of technology in enhancing learning in various disciplines*, with Sam Hulbert, Julia Williams, and Ed Doering, IHETS Purdue Conference on Technology Enhancement and Teaching and Learning, October 1997, contributed talk.

17. *Undergraduate research at the Rose-Hulman REU - what works for us*, AMS Annual meeting, Baltimore, January 1998, contributed talk.

18. *Wavelet based methods of image processing*, Applied Math Seminar, Winter 1998, 7 contributed lectures.

19. *Tilings, finite groups, and hyperbolic geometry at the Rose-Hulman REU*, Cleveland Topology Seminar, April 1998, invited lecture.

20. *Mathematical Methods of Image Processing, A Progress Report on Course Development,* with Ed Doering, AMS Annual Meeting, San Antonio, January 1999, contributed talk.

21. *How do I Teach with this Laptop Anyway?*, with Patsy Brackin, Julia Williams and Ed Doering, Rose-Hulman Showcase, October 1999, contributed talk.

22. *Laptop Program at Rose-Hulman*, with Dan Hatten, Aaron Klebanoff, and Julia Williams, Stevens Institute of Technology, invited presentation.

23. *Tilings, finite groups, and hyperbolic geometry at the Rose-Hulman REU,* Kanazawa Institute of Technology, July 1999, invited lecture.

24. *Higher genus Soccer Balls and Kaleidoscopic Tilings in the Hyperbolic Plane,* Rose Mathematics Seminar, April 2000, two contributed lectures.

25. *The Unreasonable Effectiveness of Mathematics,* Rose-Hulman Symposium to open 126'th school year, August 2000, invited presentation.

26. *Transform Methods in Image Processing*, Mathematics Faculty Seminar, Mount Holyoke College, Spring 2001, invited lecture series.

27. *Higher Genus Soccer Balls,* Mount Holyoke Math Club, Spring 2001, invited presentation.

28. *Signals, Images, ..., What's Next in Scientific Visualization,* Sigma Xi, Mount Holyoke College, Spring 2001, invited presentation.

29. *The Rose-Hulman Laptop Program,* with Ed Doering, Ohio Northern University, September 2001, invited presentation.

30. *Automorphisms of Riemann Surfaces, Galois Groups, and Hecke Algebras,* Rose Math Seminar, March 2002, contributed lecture.

31. *Vanishing Cycles and Kaleidoscopic Quadrilateral Tilings*, Rose Math Seminar, December 2002, contributed lecture.

32. *Kaleidoscopic Tilings on Surfaces, This Time with the Groups*, Rose Math Seminar, Spring 2003, two contributed lectures.

33. *Are the Students Competent Users of Mathematics?*, AMS Annual Meeting, Phoenix, January, 2004, contributed talk.

34. *Equivalence of Real Elliptic Curves*, Rose Math Seminar, October 2004, two contributed lectures.

35. *Fostering Undergraduate Research in Mathematics*, Showcase - Best Assessment Practices VII, Rose-Hulman, April 2005, contributed presentation.

36. *Enumeration of the Equisymmetric Strata of the Moduli Space of Surfaces of Low Genus*, AMS Regional Conference, Santa Barbara, April 2005 invited talk.

37. *Higher Genus Soccer Balls*, ISU Math Seminar, Fall 2006, invited presentation.

38. *Geometry from Chemistry,* Rose Math Seminar, Fall 2006, two contributed lectures.

39. *Geometry from Chemistry,* INMAA Spring Meeting, 2007, contributed talk.

40. *Classifying Pairs of Fuchsian Groups of Finite Type*, AMS Regional Conference, Tucson, April 2007, invited talk.

41. *Elementary Abelian Group Actions on Surfaces and the Geometry of Moduli Space*, IU Geometry Seminar, November, 2007, invited lecture.

42. *The Barycenter of the Numerical Range of an Operator*, ISU Math and CS Research Seminar, November 28, 2007, invited lecture.

43. *Billiards and Flat Surfaces,Voronoi Tesselations, Delaunay Tesselations and Flat Surfaces*, Rose Math Seminar, Fall 2008, two contributed lectures.

44. *Full Automorphism Groups of Cyclic n-gonal Surfaces*, First of two talks in the UNED Geometry Seminar, February 2009, invited presentation.

45. *Classification of Pairs of Fuchsian Groups*, Second of two talks in the UNED Geometry Seminar, March 2009, invited presentation.

46. *Cyclic n-gonal surfaces - weakly malnormal actions and computational methods*, joint with Aaron Wootton, 25th Nordic and 1st British-Nordic Congress of Mathematicians, June 2009, invited talk.

47. *Roll-ups and Differential Geometry*, Rose Math Seminar, Fall 2009, contributed lecture.

48. *Roll-ups and Differential Geometry*, INMAA section meeting, Fall 2009, contributed talk.

49. *Flat Surfaces, Teichmueller Discs, Veech Groups, and the Veech Tessellation,* AMS Regional Conference, Pennsylvania State University, University Park, PA, October 2009, invited talk.

50. *Galois actions on regular dessins and Fuchsian group covers*, Conference on Riemann Surfaces and Dessins d'Enfants On the Occasion of Jürgen Wolfart's 65'th Birthday, May 2010, invited talk.

51. *Who painted this Painting?* Rose Math Seminar, Spring 2012, contributed lecture.

52. *Pairs of Pants and the Congruence Laws of Geometry,* Rose Math Seminar, Spring 2013, contributed lecture.

53. *Exceptional Automorphisms of (Generalized) Super-elliptic Curves*, Riemann and Klein Surfaces,Symmetries and Moduli Spaces, Linköping Sweden, June 2013, invited talk.

54. *Framing the Image,* Rose Math Seminar, February 2015, contributed lecture.

55. *Quasi-platonic actions of $PSL2(q)$ and their Dessins,* AMS Regional Conference, Michigan State University, East Lansing MI, March 2015, invited talk.

56. *Symmetric surfaces with quasi-platonic $PSL(2, q)$ action*, AMS Regional Conference, Loyola University, Chicago IL, October 2015, invited talk.

57. *Quasi-platonic actions of some simple groups on Riemann surfaces and their dessins d'enfant*, Joint Mathematics Meetings, Seattle, WA, January 2016, invited talk.

58. *Riemann Surfaces: A playground for analysis, topology, geometry, group theory, and Galois theory,* MAI seminar, Linköping University, March 2016, invited lecture.

59. *Moduli space - Geometry/Math with Letters,* Rose Math Seminar, Fall 2016, contributed lecture.

60. *Scientific Visualization and Trigonometry: Do They Mix?* New College of Florida Data Science Seminar, Sarasota FL, October 2016, invited lecture.

61. *Subgroups of the Mapping Class Group Corresponding to 1-Dimensional Strata in the Branch Locus of Moduli Space,* with A. Costa and M. Izquierdo, AMS Annual Meeting, Atlanta GA, January, 2017, invited talk.

62. *Sabbatical Travelogue: Sweden, Spain, and China,* RHIT Global Studies Faculty Seminar, May 2017, invited presentation.

63. *Defining Equations for Riemann Surfaces, BIRS Workshop on Symmetries of Surfaces, Maps and Dessins*, Banf, Alberta, September 2017, contributed lecture.

64. *Topological and $\mathcal{H}^q$ Equivalence of Prime Cyclic p-gonal Actions on Riemann Surfaces,* AMS Regional Conference, Portland State University, Portland OR, April 2018, invited talk.

65. *Signals, Bases of Waveforms, and Frames*, College of the Holy Cross Faculty Seminar, Worcester, MA April 2019, invited lecture.

66. *Triangulations of unoriented surfaces and quantum coding theory*, with Eduardo Brandani da Silva, Special Session on Automorphisms of Riemann Surfaces, Subgroups of Mapping Class Groups and Related Topics, virtual AMS conference, March 2022, invited talk.

67. *Constructing Riemann Surfaces from Puzzle Pieces*, College of the Holy Cross Faculty Seminar, Worcester, MA February 2024, invited lecture.

68. *Geometrically Differentiating Modular Companions*, with A. Costa and M. Izquierdo. Special Session on Automorphisms of Riemann Surfaces and Related Topics, University of Wisconsin-Milwaukee, Milwaukee, WI April 2024, invited talk.