Robert M. Corless

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Born: Prince George British Columbia
Nationality: Canadian

Current position

Editor-in-Chief, Maple Transactions
Emeritus Distinguished University Professor, Western University
Adjunct Professor, Cheriton School of Computer Science, University of Waterloo
Member The Rotman Institute of Philosophy, Western University
Member The Ontario Research Centre for Computer Algebra (ORCCA)
Member Computer-Aided Research in Mathematics and Applications (CARMA), executive board

Areas of specialisation/interest

Areas of specialisation: Computational linear and polynomial algebra; computational dynamical systems; computational special functions. Areas of interest: Computational Discovery and Computational Epistemology (that is, how we can use computers to learn new things, and how we can increase our confidence that those new things are true); The Ethics of AI, especially in teaching.

Appointments held

2006–2019 Distinguished University Professor, Applied Mathematics, Western University
1998–2006 Professor, Applied Mathematics, Western University
1993–1998 Associate Professor, Applied Mathematics, Western University
1987–1993 Assistant Professor, Applied Mathematics, Western University

Education

1987 PhD in Mechanical Engineering, University of British Columbia
1982 M.Math in Applied Mathematics, University of Waterloo
1980 B.Sc in Math and Computer Science, University of British Columbia

Grants, honours & awards

1988–2026	NSERC $1,209,000 cumulative Discovery Grants
2021–2024	MICINN €114,334 co-investigator with Sonia Pérez-Díaz and Laureano González-Vega, PIs
2020	MITACS $49,000 co-investigator with Marc Moreno Maza PI
2018–2021	SSHRC $77,000 co-investigator with Nic Fillion PI
2003–2007	MITACS $250,000 co-investigator with Stephen Watt PI
1999–2003	ORDCF $514,000 co-investigator with Stephen Watt PI
1999–2003	NSERC CRD $514,000 co-investigator with Stephen Watt PI
1987–present	Various small grants, over $120,000 cumulative

2019	Visiting Fellow, Program CAT, Isaac Newton Institute, Cambridge
2019	Fellowship Giner de los Rios, Universidad de Alcalá
2017	Fellowship Giner de los Rios, Universidad de Alcalá
2012	Visiting Fellow, University of Otago, Dunedin, NZ
2011	Visiting Fellow, John Curtin School of Medical Research, ANU, Canberra, Australia
2007–2008	Visiting Fellow, John Curtin School of Medical Research, ANU, Canberra, Australia
1995	Visiting Fellow, Center for Experimental and Computational Mathematics, SFU, Vancouver, Canada
1994	Visiting Fellow, IBM T.J. Watson Research Center, Yorktown Heights, NY, USA

2019	Paul Halmos/Lester Ford award from the Mathematical Association of America
2018	Teaching Fellowship: Computational Discovery on Jupyter
2017	Pi Mu Epsilon Fraternity lecturer University of Western Michigan
2004	NSERC SYNERGY Award
2003	Mapstone Lecturer, SUNY Geneseo

Publications & talks

Journal articles

107. R. M. Corless, An Hermite–Obreshkov method for 2nd order equations, Numerical Algorithms January 9, 2024. https://doi.org/10.1007/s11075-023-01738-z
106. Chris Brimacombe, R. M. Corless, and Mair Zamir, "Elliptic cross sections in blood flow regulation," Mathematics, Science, and Industry. https://www.aimspress.com/article/doi/10.3934/math.20231176 2023.
105. Eunice Y.S. Chan and R. M. Corless, "Chaos Game Representation", SIAM Review **65** 1 pp. 261–290 2023.
104. R. M. Corless and Leili Rafiee Sevyeri, "Compact Cubic Splines", Journal of Approximation Theory. 283 2022. This is a shortened and revised version of https://arxiv.org/abs/1805.07659 (2018)
103. Eunice Y. S. Chan, R. M. Corless, Laureano González-Vega, J. Rafael Sendra, Juana Sendra, "Inner Bohemian inverses," Appl. Math. & Comp. 421 2022.

102. Fahimeh Rezaei, Mahmoud Hadizadeh, R. M. Corless, and Amirhossein Amiraslani, "Structural Analysis of Matrix Integration Operators in Polynomial Bases", Banach Journal of Mathematical Analysis 16:5 22 pages (2021).
101. Eunice Y.S. Chan, R. M. Corless, and Leili Rafiee Sevyeri, "Generalized Standard Triples", Electronic Journal of Linear Algebra Vol 37. September (2021) pp 640–658.
100. C. Brimacombe, R. M. Corless, & M. Zamir, "Computation and applications of the Mathieu Functions: A historical perspective," SIAM Review, 63 (4) pp 653–720 (2021).
99. Neil J. Calkin, Eunice Y.S. Chan, R. M. Corless, David J. Jeffrey, and Piers W. Lawrence, "A Fractal Eigenvector". American Mathematical Monthly 129 6 (2022) pp 503–523. arXiv preprint
98. R. M. Corless Sobre La Iteración Cúbica Inversa, La Gaceta de la RSME, **24** 1 (2021) 147–159.
97. R. M. Corless, D.J. Jeffrey, & D.R. Stoutemyer, Integrals of Functions Containing Parameters, Mathematical Gazette, vol. 104, no. 561, 2020, pp. 412–426.
96. Eunice Y.S. Chan, R. M. Corless, L. González-Vega, J. Rafael Sendra, Juana Sendra, and Steven E. Thornton, Bohemian Upper Hessenberg and Toeplitz Matrices, Lin. Alg. Appl., Volume 601, pp 72-100 (2020).
95. Robert H. C. Moir, R. M. Corless, David J. Jeffrey, An Unwinding Number Pair for Continuous Expressions of Integrals, J. Symbolic Computation 105 pp 97–113 (2020).
94. R. M. Corless and Leili Rafiee Sevyeri, The Runge Example for Interpolation and Wilkinson's Examples for Rootfinding SIAM Review 62.1 (2020): 231-243.
93. R.H.C. Moir, R. M. Corless, M. Moreno Maza, and N. Xie, Symbolic-Numeric Integration of Rational Functions Numerical Algorithms 83 1295–1320, (2020)
92. N. Fillion and R. M. Corless, Concepts of Solution and the Finite Element Method: a Philosophical Take on Variational Crimes. Philos. Technol. 1-20 (2019).
91. A. Amiraslani, R. M. Corless and M. Gunasingham, Differentiation Matrices for Univariate Polynomials Numerical Algorithms, 83 1–31, (2020).
90. R. M. Corless, M. Moreno Maza, and S.E. Thornton, "Comprehensive Rank Computation for Matrices Depending on Parameters." Accepted 2019 to Comm. on Comp. Algebra.
89. Ao Li and R. M. Corless Revisiting Gilbert Strang's "A Chaotic Search for i", ACM Communications on Computer Algebra. 53 (1) pp 1—22 (2019)
88. R. M. Corless and Leili Rafiee Sevyeri, Stirling's Original Asymptotic Series from a Formula like one of Binet's and its Evaluation by Sequence Acceleration, Experimental Mathematics, April 2019, pp 1–8.
87. Eunice Y.S. Chan, R. M. Corless, L. González-Vega, J. Rafael Sendra and Juana Sendra, Algebraic Linearizations of Matrix Polynomials, Lin. Alg. Appl., 563: 373-399, (2019)
86. R. M. Corless, C. Y. Kaya and R.H.C. Moir, Optimal Residuals and the Dahlquist Test Problem Numerical Algorithms, 1-22, 2018.
85. R. M. Corless and Julia E. Jankowski, Revisiting the Discharge Time of a Cylindrical Leaking Bucket ACM Communications in Computer Algebra 52 (1) 1-10 (2018).
84. Eunice Y.S. Chan and R. M. Corless, Minimal Height Companion Matrices for Euclid Polynomials Math. in Comp Sci 13 pp 1-16 (2018).
83. J. M. Borwein and R. M. Corless, Gamma and Factorial in the Monthly, American Mathematical Monthly 125 (4), 400–424 (2018)
82. Eunice Y.S. Chan and R. M. Corless, A new kind of companion matrix The Electronic Journal

of Linear Algebra, 32 pp 335–342 (2017)
81. R. M. Corless and Julia E. Jankowski, Variations on a Theme of Euler SIAM Review, 58 (4), 775-792, 2016.
80. P.W. Lawrence and R. M. Corless, Backward Error of Polynomial Eigenvalue Problems Solved by Linearization of Lagrange Interpolants SIMAX., 36(4), 1425–1442. (October 2015)
79. D.A. Aruliah, R. M. Corless, G.M. Diaz-Toca, L. González-Vega, A. Shakoori, The Bézout matrix for Hermite interpolants Linear Algebra and its Applications. Vol 474, 12–29, 2015.
78. R. M. Corless, M.M. Maza, and S.E. Thornton, "Zigzag Form of Families of Parametric Matrices," ACM Communications in Computer Algebra. Vol 48:3, 109–112, 2015
77. T.D. Lamb, R. M. Corless, and A.D. Pananos, The kinetics of regeneration of rhodopsin under enzyme-limited availability of 11-cis retinoid Vision Research. Vol 110, 23-33, 2015.
76. Y. Zhang and R. M. Corless, High-Accuracy Series Solution for Two-Dimensional Convection in a Horizontal Concentric Cylinder SIAM J. Appl. Math. vol 74, no. 3 (2014): 599-617.
75. R. M. Corless, J. Hu , and D.J. Jeffrey, On some definite integrals containing the Tree T Function ACM Communications in Computer Algebra. Vol 48:2, 33–41, 2014.
74. P.W. Lawrence and R. M. Corless, Stability of Rootfinding for Barycentric Lagrange Interpolants Numerical Algorithms. vol 65 (3) (March 2014) 447-464
73. N. Fillion and R. M. Corless, "On the epistemological analysis of modeling and computational error in the mathematical sciences," Synthèse, 191 (May 2014): 1451-1467
72. R. M. Corless, "Pseudospectra for Exponential Matrix Polynomials," Theoretical Computer Science, Volume 479 (April 2013) 70–80.
71. C. Chen, R. M. Corless, M. Moreno Maza, P. Yu, and Y.Zhang, "An Application of Regular Chain Theory to the Study of Limit Cycles" Int. J. Bifurcations and Chaos. Volume 23, Issue 9 (September 2013) 21 pages.
70. R. M. Corless, G.M. Diaz-Toca, M. Fioravanti, L. González-Vega, I.F. Rua, and A.Shakoori, "Computing the topology of a real algebraic plane curve whose defining equations are available only 'by values'," Computer Aided Geometric Design,30 (7) (Oct 2013) 675–706
69. G.A. Kalugin, D.J. Jeffrey, R. M. Corless, "Bernstein, Pick, Poisson and related integral expressions for Lambert W," Integral Transforms and Special Functions.Volume 23, Issue 11 (2012) 817-829.
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61. S.Brennan & R. M. Corless, "Creating a Warmer Environment for Women in the Mathematical Sciences and in Philosophy," Atlantis, Vol 33(2) (2009) 54-61.
60. R. M. Corless, A. Shakoori, D.A. Aruliah, & L. González-Vega,"Barycentric Hermite Interpolants for Event Location in Initial-Value Problems," Journal of Numerical Analysis, Industrial and Applied Mathematics, Vol. 3, no. 1-2 (2008) 1-16
59. M. Bronstein, R. M. Corless, J.H. Davenport & D.J. Jeffrey, Algebraic Properties of the Lambert W Function Integral Transforms & Special Functions , Vol. 19 (10) (2008) 709-712.
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55. A. Amiraslani, D.A. Aruliah and R. M. Corless, "Block LU Factors of Generalized Companion Matrix Pencils," Theoretical Computer Science 381.1-3 (2007) 134-147
54. R. M. Corless, N. Rezvani, & A. Amiraslani, "Pseudospectra of matrix polynomials expressed in alternative bases," Mathematics and Computer Science, 1 (2007) 353-374
53. G.C. Essex, S. Ilie, and R. M. Corless, Broken symmetry and long-term forecasting. *Journal of Geophysical Research: Atmospheres*, 112(D24), 2007.
52. J. Zhao, M. Davison & R. M. Corless, "Compact Finite Difference Method for American Option Pricing,"Journal of Computational and Applied Mathematics 26(1)(2007) 306-321
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50. J. Zhao, R. M. Corless & M. Davison "Financial Applications of Symbolically Generated Compact Finite Difference Formulae," Financial applications of symbolically generated compact finite difference formulae. In Dongming Wang and Lihong Zhi, editors, *Symbolic-Numeric Computation*, pages 361–374. Birkhäuser, Basel, 2007.
49. S. Ilie, R. M. Corless & G. J. Reid, "Numerical solutions of index-1 differential algebraic equations can be computed in polynomial time" Numer. Algorithms 41, (2006) 161-171
48. J. Zhao & R. M. Corless, "Compact Finite ,Difference Method for Integro-Differential Equations," Appl. Math. Comput. 177, No. 1, (2006) 271-288.
47. J. Zhao, T. Zhang, & R. M. Corless, "Convergence of compact finite difference methods for second-order elliptic equations," Appl. Math. Comput. 182, No. 2, (2006) 1454-1469.
46. J. M. Heffernan & R. M. Corless, "Solving some delay differential equations with computer algebra," The Mathematical Scientist, 31, no. 1, (2006) 21-34.
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44. M. Benghorbal & R. M. Corless, "A unified formula for arbitrary order symbolic derivatives and integrals of a rational polynomial," Int. Journal of Pure and Applied Mathematics, 16, no. 2 (2004) 193-201.
43. M. Benghorbal & R. M. Corless, "Power series solutions of fractional differential equations," Int. Journal of Pure and Applied Mathematics, 15, no. 3 (2004) 333-352.
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41. R. M. Corless, L. González-Vega, I. Necula, A. Shakoori, "Topology Determination of Implicitly Defined Real Algebraic Plane Curves," An. Univ. Timisoara Ser. mat.-Inform., 41 (Special Issue): (2003) 83-96.
40. R.J. Bradford, R. M. Corless, J.H.Davenport, D.J.Jeffrey, & S.M. Watt: "Reasoning about the elementary functions of complex analysis," Ann. Maths Art. Intel., 36, (2002) 303-318.
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37. S.R. Valluri, R. M. Corless, & D.J. Jeffrey, "Some applications of the Lambert W function to physics", 78, Canadian J. of Physics (2000) 823-831.
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35. J.M. Borwein & R. M. Corless, "Emerging tools in experimental mathematics," American Mathematical Monthly, vol. 106, (December 1999) 889-909.
34. E. Katende, A. Jutan & R. M. Corless, "Quadratic nonlinear predictive control," Industrial and Engineering Chemistry Research, 37 (1998) 2721-2728.
33. R. M. Corless, "Variations on a theme of Newton," Math Mag, 71 (Feb 1998) 34–41.
32. D. J. Jeffrey, D.E.G. Hare, & R. M. Corless, "Exact rational solutions of a transcendental equation," Comptes Rendus (Mathematics), vol 20, 3 (1998) 71-76.
31. H.B. Bauschke & R. M. Corless, "Analyzing a projection method with Maple," Maple Tech (special issue Maple in the Mathematical Sciences), vol 4, no. 1 (1997) 2-7.
30. R. M. Corless & D.J. Jeffrey, "Scientific computing: One part of the revolution," special issue J. of Symbolic Computation 23 (1997) 485-495.
29. R. M. Corless, D.J. Jeffrey, Pratibha & M.B. Monagan, "Two perturbation calculations in fluid mechanics using large expression management," J. Symb. Comp, 23 (1997) 427-443.
28. J.M. Borwein, P.B. Borwein, S. Braham, R. M. Corless, & L. Jorgenson, "Digitally activated mathematics for a brave new world wide web," Ed. Res. & Persp, 23, no. 2 (1996) 28–47.
27. R. M. Corless, G.H. Gonnet, D.E.G. Hare, D.J. Jeffrey & D.E. Knuth, "On the Lambert W function", Advances in Computational Mathematics 5 (1996) 329-359.
26. D.J. Jeffrey, D.E.G. Hare & R. M. Corless, "Unwinding the branches of the Lambert W Function," Mathematical Scientist, 21, (1996) 1-7.
25. D.J. Jeffrey, R. M. Corless, D.E.G. Hare & D.E. Knuth, "Sur l'inversion de $y^\alpha e^y$ au moyen des nombres de Stirling associés," Comptes Rendus de L'Académie des Sciences, Paris, 320, 1, 12 (1995) 1449-1452.
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tems," J. Mathematical Analysis & Applications, 189 (1995) 409-423.
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20. R. M. Corless & M.B. Monagan, "Simplification and the assume facility", MapleTech (1994) 24-31.
19. T. Scott, B. Madore & R. M. Corless, "Maple in Science education," Special Issue of MapleTech (1994) 58-68.
18. T. Scott, G. Fee, R. M. Corless & M.B. Monagan, "Applications of Maple to mathematical, scientific, and engineering problems," Special Issue of MapleTech (1994) 49-57.
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12. R. M. Corless, G.H. Gonnet, D.E.G. Hare and D.J. Jeffrey, "Lambert's W function in Maple," MapleTech #9 (1993) 12-22.
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6. R. M. Corless, C. Essex, M.A.H. Nerenberg, "Numerical methods can suppress chaos," Physics Letters A 157, 1 (1991) 27-36.
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4. R. M. Corless & D.J. Jeffrey, "Solution of a hydrodynamic lubrication problem with Maple," J. Symbolic Computation 9 (1990) 503-513.
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and galloping," J. Fluids and Structures 2 (1988) 203-220.

2. R. M. Corless & D.J. Jeffrey, Stress moments of nearly touching spheres in low Reynolds number flow. *ZAMP Zeitschrift für angewandte Mathematik und Physik*, 39(6):874–884, 1988.
1. D.J. Jeffrey & R. M. Corless, Forces and stresslets for the axisymmetric motion of nearly touching spheres. *Physico-Chemical Hydrodynamics*, 10(4):461–470, 1988.

Articles in Refereed Conference Proceedings

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58. R. M. Corless, George Labahn, Dan Piponi, & Leili Rafiee Sevyeri, Bohemian Matrix Geometry, Proceedings of ISSAC, July (2022), 361–370
57. Neil J. Calkin, Eunice Y. S. Chan, & R. M. Corless, "Computational Discovery with Newton Fractals, Bohemian Matrices, & Mandelbrot Polynomials", In Wei-Chi Yang and Douglas Meade, editors, *Proceedings of the Asian Technology Conference in Mathematics*. 2021.
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55. R. M. Corless & Erik Postma, Blends in Maple, in R. M. Corless et al. (Eds.): Proceedings of the Maple Conference 2020, CCIS 1414, pp. 167–184, 2021
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Papers by my students while they were under my supervision

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4. R. M. Corless, "Review of Solving Transcendental Equations, by John P. Boyd" SIAM Review vol. 57, issue 4 (December 2015).
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Technical Reports and Unrefereed Works

Because I am Editor-in-Chief of Maple Transactions, my papers in that journal do not count as refereed. I do consult the other editors and sometimes external people and use their feedback to improve these papers. Similarly, while I was Editor-in-Chief of ACM SIGSAM Bulletin and later Chair of SIGSAM, ie until 2003, my papers there did not count as refereed, either. Retrospectively, these papers seem to have had about half the citation impact that they might have had otherwise; I still think this was a worthwhile thing to do.

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ORCCA Technical Report TR-00-09, (2000), 10 pages
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Other publications

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4. Neil J. Calkin, Eunice Y.S. Chan, & R. M. Corless: The Computational Discovery on Jupyter Calendar 2024.
3. Neil J. Calkin, Eunice Y.S. Chan, & R. M. Corless: The Bohemian Matrix Calendar 2023. The 2022 version was entered in the Clemson Science as Art competition.

2. R. M. Corless, The Lambert W Function Poster (2004) This poster describes some interesting properties of a recently named mathematical function. 4000 copies were produced and widely distributed. http://www.orcca.on.ca/LambertW/
1. R. M. Corless, "About the Applied Math Coffee Mug Design" (1998)

Selected talks

28. Perturbation Methods Using Backward Error, at GO20, Gozo, May 2024
27. Progress with Minimal Height Companion Matrices, at DSW70 minisymposium at SIAM Applied Linear Algebra, Paris, May 2024
26. Surprising Companions, at DW75, Leuven, May 2024
25. The Butcher Factor, at woRK24, Auckland, March 2024
24. Blendstrings: an environment for computing with smooth functions, at Numerical Analysis in the 21st Century, Oxford, August 2023
23. Generalized Standard Triples, FMD60, Madrid, July 2023
22. Algebraic Companions, ILAS, Galway, 2022
21. Teaching Programming to Mathematical Scientists, CUNEF, Madrid, Spain, February 2020
20. Masterclass on Maple (parts I and II), Isaac Newton Institute, 2019
19. "An Old Special Function meets a (slightly) Newer One", Isaac Newton Institute, Nov 2019
18. "Bohemian Companions", MEGA 2019 plenary, Madrid, June 2019
17. "Gamma and Factorial in the Monthly", opening plenary, ACA (Jerusalem Israel, 17 July, 2017).
16. "Approximating the Functional Inverse of Gamma", BIRS video link (Oaxaca Mexico 2016).
15. "The Lambert W Function", Celebrating 20 years of W (Western University, July 2016).
14. "Bohemian Eigenvalues", Computational Discovery (Western, 2016). YouTube Link
13. "Twenty plus years of the Lambert W Function", International Conference on Analysis, Applications, and Computations: In Memory of Lee Lorch, Fields Institute (September 2015).
12. "Optimal Backward Error and the Leaky Bucket", ACMES (Western University, May 2015)
11. "Optimal Backward Error and the Dahlquist Test Problem", SPCOM (Newcastle AU, 2015)
10. "Computer Algebra for Experimental Mathematics", TRICS (Western, 2014)
9. "What is Experimental Mathematics?", Undergraduate Society of Applied Mathematics (Western University, October 2014)
8. "Numerical Stability of Polynomial Eigenvalue Algorithms in the Lagrange Basis," MATFUN (Manchester, UK) (April 2013).
7. "Polynomial or Rational Interpolants in the Lagrange Basis," ANODE (Auckland 2013).
6. "Defect assessment for numerical solutions of chaotic DE," MAGIC (Mistletoe Bay NZ 2012).
5. "First encounters of a Chebfun Novice," ICIAM, Vancouver (2011).
4. "Polynomial Algebra for Birkhoff Interpolants," SANUM, Stellenbosch, SA (2010).
3. "Pseudospectra of Matrix Exponential Polynomials," SNC, Kyoto, Japan (August 2009).
2. "Numerical Nonlinear Algebra," COSCOMP Conference on Scientific Computing, Vienna, Austria, (June 2005).
1. "Computer-Mediated Thinking," Invited plenary lecture at "Technology in Mathematics Education", TIME, Montreal, (July 2004).

Teaching

Philosophy

Teaching is an essential part of scholarship. My late friend and colleague, Vic Elias, put it this way: "You teach this stuff long enough, you learn how to use it." The 1981 Nobel Laureate for Chemistry, Roald Hoffman, similarly said "[I]t is through teaching that [young academics] become better researchers." It is also true that the teaching part of a professor's career, which nominally makes up only 40% of the workload, is expected to have by far and away the greatest direct and leveraged effect on society and civilization. Teaching makes us human. But research informs teaching, too. The first and most obvious way is in constructing syllabi and the programs they shape: research tells us what to teach, and why. Therefore, *what* to teach changes continually as knowledge advances. Further, *tools* for teaching have changed radically with the introduction of the web, wide social networks, online resources including videos, and will change even more radically as AI takes hold. But another way that research informs teaching, which is likely to remain important, is that human researchers can show themselves as excited learners, and can share the electricity of being on the border of the unknown. Research also tells us (if we're listening) *how* to teach, and how students learn. The pedagogical literature is unequivocal: engaged, active learning is a critical component in deep, integrated learning. The student must do, to understand. The addition of radical new tools has not changed that, so far. Finally, teaching is a human activity. Besides having something to teach, and knowing how to teach it, the professor must be a social person, able to show warmth, strength, and confidence, as needed. Goethe in a letter to one of his teachers said "instruction does much, but encouragement does more." Teachers must continually learn how to best encourage students. This is critical for equity, which is a moral imperative. It also has an instrumental benefit, by effectively broadening the pool of talent for recruitment.

Record

I was at Applied Mathematics at Western for thirty-two years. I taught engineering mathematics at all levels, applied mathematics for scientists at all levels, and a wide variety of graduate courses. Since about 2010 I have used and continue to advocate for *active learning*. I designed the introductory undergraduate and graduate numerical analysis courses. In 2014 I designed a course in experimental mathematics, which is described in some of my publications listed above. Recent courses, ignoring sabbaticals in the dates, are listed in Table 1. The normal teaching requirements in Applied Mathematics at Western were four half-courses per year, with one half-course reduced if you supervise three graduate students. Apart from sabbaticals and the occasional overload, this is the amount I taught.
Several of my listed publications can be considered research in mathematics education; for instance, the book chapter 9 listed above. I am particularly concerned with the ethics of teaching with AI.
I have supervised or co-supervised seventeen PhD theses, twelve masters theses, and eight post-doctoral fellows (one currently). My former students have gone on to careers in academia and in industry. I have supervised twenty-six honours B.Sc. theses; many of these students have gone on to graduate degrees at excellent institutions, including Oxford.
I continue to serve on thesis committees, examining boards, as external examiner (most recently for two theses out of the University of Newcastle, Australia), and as chair of thesis exams at Western.

2012–2019	AM2813b/14g	Numerical Analysis	7/7
2017–2019	AM3811a	Complex Variables	7/7
2009–2019	AM9561a	Graduate Numerical Analysis	7/7
2014–2016	AM9619a/b	Open Problems in Experimental Mathematics	7/7
2014–2015	AM1999f	Experimental Mathematics	7/7
2013–2016	CA2303b	Calculus IV	7/7
2015–2016	AM2276b	Engineering Calculus IV	5/7
2010–2013	CA1301b	Calculus II	5/7
2010–2011	CA1000a	Calculus I	5/7

Table 1: Courses taught 2010–2019 and median student survey results

List of PhD Students advised or co-advised:

2020 Leili Rafiee Sevyeri, Hybrid Symbolic-Numeric Computing in Linear and Polynomial Algebra
2019 Eunice Y.S. Chan, Algebraic Companions and Linearizations
2019 Steven E. Thornton, Algorithms for Bohemian Matrices
2017 Robert H. C. Moir, Feasible Computation in Symbolic and Numeric Integration
2013 Yiming Zhang, Computation Sequences for Series and Polynomials
2013 Piers W. Lawrence, Eigenvalue methods for Interpolation Bases
2009 Hui Ding, Numerical and Symbolic Computation of the Lambert W Function in $C^{n\times n}$
2007 Azar Shakoori, Bivariate Polynomial Solver by Values
2006 Jichao Zhao, Accurate Compact Finite Difference Method and its Applications
2006 Amir Amiraslani, New Algorithms for Matrices, Polynomials, and Matrix Polynomials
2006 Marie-Paule Gagne-Portelance, Computing Feynman Integrals in Non-Commutative Spaces
2005 Silvana Ilie, Computational Complexity of Numerical Solutions of IVPs for DAEs
2004 Mhenni Benghorbal, Power Series Solutions of Fractional DE's and Symbolic Derivatives
2000 Hualiang Zhong, Non-harmonic Fourier Series and Applications
1999 Xianping Liu, Symbolic Tools for the Analysis of Nonlinear Dynamical Systems
1998 Anne-Marie E. Allison, Analytical Investigation of a Semi-empirical Flow- induced Vibration Model
1997 Mohammed O. Ahmed, Exploration of Compact Methods for Numerical Solution of PDEs

List of Masters Students advised or co-advised:

2024– Michelle Lynn Hatzel, Western, In progress
2019 Irene Novarinho, AIMS, Backward Error for Continued Fractions
2019 Jeet Trivedi, A Survey of Quadrature Methods for Oscillatory Integration
2016 Eunice Y.S. Chan, A Comparison of solution methods for Mandelbrot-like polynomials
2016 Leili Rafiee Sevyeri, A Sequence of Symmetric Bézout Matrix Polynomials
2011 Nic Fillion, Backward Error Analysis as a Model of Computation
2010 Robert H. C. Moir, Reconsidering backward error
2005 Nargol Rezvani, Approximate Polynomials in Different Bases
2003 Azar Shakoori, Solving Bivariate Polynomials by Eigenvalues
2001 Xiaofang Xie, Symbolic Circuit Analysis
2001 Dicheng Liu, A Notation Selection Tool for MathML
2000 Gurjeet Litt, Unwinding Numbers for the Logarithmic, Inverse Trig & Hyperbolic Functions
1995 Xianping Liu, Perturbation Package to solve ODEs in Maple
1990 Valentin Vangelov, <record of project title lost>

Service to the profession

Leadership positions

I was Scientific Director of the Ontario Research Center for Computer Algebra (ORCCA) from 2015 until 2022, and the founding Deputy Director before that. ORCCA is a consortium of twelve faculty members and about sixty graduate students and postdoctoral fellows at Western University and the University of Waterloo, with other members at other Ontario universities. See www.orcca.on.ca. I was Chair of the Department of Applied Mathematics from 2002 till 2007. I was elected Chair of the ACM Special Interest Group on Symbolic and Algebraic Manipulation (SIGSAM) from 1999–2003. I enjoy such roles, because they give me a chance to ensure that my colleagues get the appropriate rewards for the work that they do. During my time as Department Chair of Applied Mathematics, I directed the hiring of five tenure-stream faculty, and successfully lobbied for market adjustments in salary for several outstanding faculty and staff members, successfully nominated many people for research and teaching awards, and fostered the increase in percentage of female PhD students, to the point where we were the first mathematical sciences department of any substantial size to reach 50%. Overall the Department's profile grew significantly while I was Chair, and the number of faculty members grew from 14 to 19. I also oversaw a fundamental change in research direction, away from classical fluid mechanics and into mathematical biology, mathematical finance, and computational materials and biomaterials. All three research areas are vigorous to date.

I have been committed to equity for decades. Equity is, of course, a moral imperative, and a duty owed. However, equity and diversity are also of instrumental value, with recent publications documenting the increased impact that diverse teams have in research (as measured by citation count). But even if it were of *no* instrumental value, it would still be required of us.

The other techniques to increase equity and diversity that I have learned from my experience, beginning when I was the CAIMS delegate to the CMS Committee for Women in Mathematics, are still needed today. The principal lesson is that *warmth*—of course, rule-governed warmth—is needed, rather more than one might expect from mathematicians, and rather more than was traditionally available in a science or engineering educational context. See my paper "Creating a Warmer Environment for Women in Mathematics and in Philosophy" with Samantha Brennan (paper 61 in the list of journal papers above) for more details.

University Service

I have served on most of the usual committees appropriate for my years of experience, including University Senate, selection committees for Deans and Chairs, and P&T committees.

I am a member of the Rotman Institute for Philosophy and have been since its founding in 2008. I have served on its Steering Committee, and on search committees for interdisciplinary CRC candidates. Many people *talk* about interdisciplinarity and multidisciplinarity, but the Rotman Institute actually practices it. I am very proud of my connection to the Institute.

Academic external service

I regularly serve in various roles for conference organization; I was co-Chair with Paulina Chin of the Program Committee for the Maple Conference Nov 2–5 2021; I was previously co-Chair with Jürgen

Gerhard for the 2020 conference. I have been the principal organizer for conferences sponsored by the Fields Institute, and for minisymposia at SIAM meetings and at ICIAM. I organized a successful minisymposium on Bohemian Matrices for ILAS 2023 in Madrid.

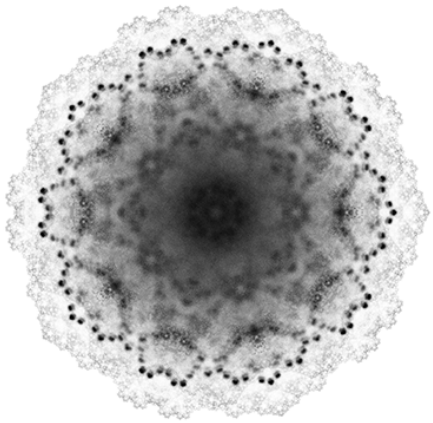
I was the Editor-in-Chief of the ACM SIGSAM Bulletin from 1996–1999. In that time I wrote several editorial columns (listed in Technical Reports and Unrefereed Contributions above), some of which later became highly cited. I instituted the Formally Reviewed Articles section of the Bulletin, and changed the name of the publication to ACM Communications in Computer Algebra. In this endeavour I was helped greatly by David Jeffrey, who became Editor-in-Chief when I became SIGSAM Chair, and who continued and solidified this work.

I am now the Editor-in-Chief of Maple Transactions, a new open-access scholarly journal sponsored by Maplesoft and by Scholarship Western. This journal has no page charges for authors, and was launched in June 2021.

I am a life member of CAIMS (the Canadian Applied and Industrial Mathematics Society), a member of ACM and ACM SIGSAM, a member of the Canadian Society for History and Philosophy of Mathematics, and a member of SIAM.

I have reviewed several departments and programs and for granting agencies (including for the NSF (USA), the ANR (France), and the FWF (Austria)). I am a regular reviewer for several journals, including the American Mathematical Monthly, Linear Algebra and Applications, Numerical Algorithms, the Journal of Symbolic Computation, and SIAM Review.

Endnote: Bohemian Matrices and Visualization of Mathematics



Just to have a nice picture at the end of my CV, here is a density plot of the complex eigenvalues of ten million upper Hessenberg Toeplitz matrices with population from the fifth roots of unity. See bohemianmatrices.com, the journal paper 96, or the unrefereed note 32 for more information. Image by my former PhD student Steven E. Thornton.