Robert M. Corless

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Born: Prince George British Columbia
Nationality: Canadian

Current position

Emeritus Distinguished University Professor, Western University
Adjunct Professor, David R. Cheriton School of Computer Science, University of Waterloo
Member The Rotman Institute of Philosophy, Western University

Areas of specialisation

Computational linear and polynomial algebra; computational dynamical systems; computational special functions; hybrid symbolic-numeric computation. Computational Discovery and Computational Epistemology: 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

1988–2025	NSERC \$1,180,000 cumulative Discovery Grants
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

98. Neil Calkin, Eunice Y.S. Chan, Robert M. Corless, David J. Jeffrey, and Piers W. Lawrence, "A Fractal Eigenvector". Accepted 2021.03.25 to the American Mathematical Monthly.

97. Robert M. Corless Sobre La Iteración Cúbica Inversa, La Gaceta de la RSME, **24**(1) 147–159.

96. Robert M. Corless, D.J. Jeffrey, & D.R. Stoutemyer, Integrals of Functions Containing Parameters, Mathematical Gazette, vol. 104, no. 561, 2020, pp. 412–426.

95. E.Y.S. Chan, Robert M. Corless, L. Gonzalez-Vega, J. Rafael Sendra, Juana Sendra, and Steven E. Thornton, Bohemian Upper Hessenberg and Toeplitz Matrices, Linear Algebra and its Applications, Volume 601, pp 72-100 (2020).

94. Robert H. C. Moir, Robert M. Corless, David J. Jeffrey, An Unwinding Number Pair for Continuous Expressions of Integrals, J. Symbolic Computation 2020.

93. N. Fillion and Robert M. Corless, Concepts of Solution and the Finite Element Method: a Philosophical Take on Variational Crimes. Philos. Technol. 1-20 (2019).

92. R.H.C. Moir, Robert M. Corless, M. Moreno Maza, and N. Xie, Symbolic-Numeric Integration of Rational Functions Numerical Algorithms 1-26, May 2019

91. Robert M. Corless, M. Moreno Maza, and S.E. Thornton, "Comprehensive Rank Computation for Matrices Depending on Parameters." Accepted 2019 to Comm. on Comp. Algebra.

90. Ao Li and Robert M. Corless Revisiting Gilbert Strang's "A Chaotic Search for i", ACM Communications on Computer Algebra. Vol 53 no 1 pp1—22 March 2019

89. A. Amiraslani, Robert M. Corless and M. Gunasingham, Differentiation Matrices for Univariate Polynomials Numerical Algorithms, 83 1–31, 2019.

88. Robert M. Corless and Leili Rafiee Sevyeri, The Runge Example for Interpolation and Wilkinson's Examples for Rootfinding SIAM Review 62.1 (2020): 231-243.

87. Robert 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, 2019.

86. E.Y.S. Chan, Robert M. Corless, L. Gonzalez-Vega, J. Rafael Sendra and Juana Sendra, Algebraic Linearizations of Matrix Polynomials, Linear Algebra and its Applications, 563: 373-399, 2019. https://doi.org/10.1016/j.laa.2018.10.028

85. Robert M. Corless, C. Y. Kaya and R.H.C. Moir, Optimal Residuals and the Dahlquist Test Problem Numerical Algorithms, 1-22, 2018.

84. Robert M. Corless and Julia E. Jankowski, Revisiting the Discharge Time of a Cylindrical Leaking Bucket ACM Communications in Computer Algebra, 1-10, 2018.

83. E.Y.S. Chan and Robert M. Corless, Minimal Height Companion Matrices for Euclid Polynomials Math. in Comp Sci, 1-16, 2018.

82. J. M. Borwein and Robert M. Corless, Gamma and Factorial in the Monthly, American Mathematical Monthly 125 (4), 400–424, 2018.

81. E.Y.S. Chan and Robert M. Corless, A new kind of companion matrix The Electronic Journal of Linear Algebra, vol. 32, 335-342, 2017

80. Robert M. Corless and Julia E. Jankowski, Variations on a Theme of Euler SIAM Review, 58 (4), 775-792, 2016.

79. P.W. Lawrence and Robert M. Corless, Backward Error of Polynomial Eigenvalue Problems Solved by Linearization of Lagrange Interpolants SIMAX., 36(4), 1425–1442. (October 2015)

78. D.A. Aruliah, Robert M. Corless, G.M. Diaz-Toca, L. Gonzalez-Vega, A. Shakoori, The Bézout matrix for Hermite interpolants Linear Algebra and its Applications. Vol 474, 12-29, 2015.

77. T.D. Lamb, Robert 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 Robert 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. Robert 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 Robert M. Corless, Stability of Rootfinding for Barycentric Lagrange Interpolants Numerical Algorithms. vol 65 (3) (March 2014) 447-464

73. N. Fillion and Robert M. Corless, "On the epistemological analysis of modeling and computational error in the mathematical sciences," Synthèse, 191 (May 2014): 1451-1467

72. Robert M. Corless, "Pseudospectra for Exponential Matrix Polynomials," Theoretical Computer Science, Volume 479 (April 2013) 70–80.

71. C. Chen, Robert M. Corless, M.Moreno Maza, P. Yu, and Y.Zhang, "An Application of Reg-

ular Chain Theory to the Study of Limit Cycles" Int. J. Bifurcations and Chaos. Volume 23, Issue 9 (September 2013).

70. Robert M. Corless, G.M. Diaz-Toca, M. Fioravanti, L. Gonzalez-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

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67. G.A. Kalugin, D.J. Jeffrey, Robert M. Corless and P.B. Borwein, "Stieltjes and other integral representations for functions of Lambert W," Integral Transforms and Special Functions, Volume 23, Issue 8, 2012 581-593.

66. Robert M. Corless, E. Postma, and D.R. Stoutemyer. 2011. "Rounding coefficients and artificially underflowing terms in non-numeric expressions,"ACM Commun. Comput. Algebra 45, 1/2 (July 2011) 17-48

65. J.C. Butcher, Robert M. Corless, L. Gonzalez-Vega and A. Shakoori, "Polynomial Algebra for Birkhoff Interpolants," Numerical Algorithms, Volume 56, Issue 3 (March 2011) 319-347.

64. P. Yu and Robert M. Corless, "Symbolic computation of limit cycles associated with Hilbert's 16th problem," Comm. Nonlin. Science and Numerical Simulation, Vol 14, (2009), 4041- 4056

63. Robert M. Corless, K. Gatermann, & I.S. Kotsireas, "Using symmetries in the eigenvalue method for polynomial systems," Special Issue of the Journal of Symbolic Computation (Chemistry and Biological Applications) in honour of Karin Gatermann 44:1,(2009) 1536-1550.

62. A. Amiraslani, P. Lancaster & Robert M. Corless, "Linearization of matrix polynomials expressed in polynomial bases," IMA Journal of Numerical Analysis Vol 29, No. 1, (2009) 141-157

61. S.Brennan & Robert M. Corless, "Creating a Warmer Environment for Women in the Mathematical Sciences and in Philosophy," Atlantis, Vol 33(2) (2009) 54-61.

60. Robert M. Corless, A. Shakoori, D.A. Aruliah, & L. Gonzalez-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, Robert 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.

58. Robert M. Corless & S. Ilie, "Polynomial cost for solving IVP for high-index DAE," BIT Numerical Mathematics, (2008) 48: 29-49.

57. G. Söderlind, S. Ilie & Robert M. Corless, "Adaptivity and Computational Complexity in the Numerical Solution of ODEs,"Journal of Complexity, 24 3 (2008) 341-361

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55. A. Amiraslani, D.A. Aruliah and Robert M. Corless, "Block LU Factors of Generalized Companion Matrix Pencils," Theoretical Computer Science 381.1-3 (2007) 134-147

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53. C. Essex, S. Ilie, and Robert M. Corless, "Symmetry Breaking and Long-Term Forecasting," J. Geophys. Research (2007) Vol. 112, D24S17

52. J. Zhao, M. Davison & Robert M. Corless, "Compact Finite Difference Method for American Option Pricing," Journal of Computational and Applied Mathematics 26(1)(2007) 306-321

51. Robert M. Corless, "On a generalized companion matrix pencil for matrix polynomials expressed in the Lagrange basis," Trends in Mathematics (2007) 1-16

50. J. Zhao, Robert M. Corless & M. Davison "Financial Applications of Symbolically Generated Compact Finite Difference Formulae," Trends in Mathematics (2006) 361-374.

49. S. Ilie, Robert 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

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46. J. M. Heffernan & Robert M. Corless, "Solving some delay differential equations with computer algebra," The Mathematical Scientist, 31, no. 1, (2006) 21-34.

45. N.Rezvani & Robert M. Corless, "The nearest polynomial with a given zero, revisited," SIGSAM Bulletin, Communications in Computer Algebra, 39, no. 3 (September 2005) 73-79.

44. M. Benghorbal & Robert 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 & Robert M. Corless, "Power series solutions of fractional differential equations," Int. Journal of Pure and Applied Mathematics, 15, no. 3 (2004) 333-352.

42. Robert M. Corless, S.M. Watt & L. Zhi, "QR Factoring to compute the GCD of univariate approximate polynomials," IEEE Trans. Sig. Proc., 52, no. 12, (December 2004) 3394-3402.

41. Robert M. Corless, L. Gonzalez-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.

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31. H.B. Bauschke & Robert 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. Robert M. Corless & D.J. Jeffrey, "Scientific computing: One part of the revolution," special issue J. of Symbolic Computation 23 (1997) 485-495.

29. Robert 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, Robert M. Corless, & L. Jorgenson, "Digitally activated mathematics for a brave new world wide web," Ed. Res. & Persp, 23, no. 2 (1996) 28–47.

27. Robert 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 & Robert M. Corless, "Unwinding the branches of the Lambert W Function," Mathematical Scientist, 21, (1996) 1-7.

25. D.J. Jeffrey, Robert M. Corless, D.E.G. Hare & D.E. Knuth, "Sur l'inversion de yaey au moyen des nombres de Stirling associés," Comptes Rendus de L'Académie des Sciences, Paris, 320, 1, 12 (1995) 1449-1452.

24. Robert M. Corless & S. Yu Pilyugin, "Approximate and real trajectories for generic dynamical systems," J. Mathematical Analysis & Applications, 189 (1995) 409-423.

23. Robert M. Corless, "Bifurcation in a flow-induced vibration model," American Math Society; Fields Institute Communications, vol. 4 (1995) 43-59.

22. Robert M. Corless & S. Yu Pilyugin, "Evaluation of upper Lyapunov exponents on hyperbolic sets," Journal of Mathematical Analysis and Applications 189 (1995) 145-159.

21. Robert M. Corless, "Symbolic computation in nonlinear dynamics," Open Systems & Information Dynamics 3.1 (1995) 131-147.

20. Robert M. Corless & M.B. Monagan, "Simplification and the assume facility", MapleTech (1994) 24-31.

19. T. Scott, B. Madore & Robert M. Corless, "Maple in Science education," Special Issue of MapleTech (1994) 58-68.

18. T. Scott, G. Fee, Robert M. Corless & M.B. Monagan, "Applications of Maple to mathematical, scientific, and engineering problems," Special Issue of MapleTech (1994) 49-57.

17. Robert M. Corless, "What good are numerical solutions of chaotic differential equations?," Computers in Mathematics with Applications vol 28, no. 10-12 (1994) 107-121.

16. Robert M. Corless, "Error backward," Contemporary Mathematics 172 (1994) 31-62.

15. Robert M. Corless, "Six, Lies, and Calculators," American Mathematical Monthly, vol 100, no. 4, (1993) 344-350.

14. Robert M. Corless & G.V. Parkinson, "Mathematical modelling of the combined effects of vortex-induced vibration and galloping, Part II," J. of Fluids & Structures 7, (1993) 825-848.

13. A.G. Connell & Robert M. Corless, "An experimental interval arithmetic package in Maple," Interval Computations, No. 2, (1993) 120-134.

12. Robert M. Corless, G.H. Gonnet, D.E.G. Hare and D.J. Jeffrey, "Lambert's W function in Maple," MapleTech #9 (1993) 12-22.

11. T.C. Scott, M.B. Monagan, G.J. Fee & Robert M. Corless, "Some Applications of Maple to

mathematical, scientific and engineering problems," Artificial Intelligence, Expert Systems & Symbolic Computing (1992) 165-176.

10. P.A. Rosati, Robert M. Corless, C. Essex, & P.J. Sullivan, "An evaluation of the HP28S calculator in calculus," Australian J. of Engineering Education vol 3, no. 1 (1992) 79-88.

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4. Robert M. Corless & D.J. Jeffrey, "Solution of a hydrodynamic lubrication problem with Maple," J. Symbolic Computation 9 (1990) 503-513.

3. Robert M. Corless & G.V. Parkinson, "A model of the combined effects of vortex-induced oscillation and galloping," J. Fluids and Structures 2 (1988) 203-220.

2. Robert M. Corless & D.J. Jeffrey, "Stress moments of nearly touching spheres in low Reynolds number flows," ZAMP 39 (1988) 874-884.

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Articles in Refereed Conference Proceedings

53. Robert M. Corless, Leili Rafiee Sevyeri, and B. David Saunders, "Equivalences for Linearizations of matrix polynomials", arXiv preprint accepted for ISSAC (2021).

52. Robert M. Corless & Erik Postma, "Blends in Maple", arXiv preprint Accepted to the Proceedings of the Maple 2020 Conference (2021).

51. Robert M. Corless, M.W.Giesbrecht, L. Rafiee Sevyeri, B.D. Saunders, On Parametric Linear System Solving Computer Algebra and Scientific Computing 2020 188–205.

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rameters from Frobenius Form with Parameters." MACIS (2017), 179-194.

44. K.A. Folitse, D.J. Jeffrey, and Robert M. Corless, "Inverse of the Gamma function." SYNASC Proceedings (2017).

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Papers by my students while they were under my supervision

5. S. Bangu and R.H.C. Moir, "The Miracle of Applicability? The Curious Case of the Simple Harmonic Oscillator", Foundations of Physics (2018) 1-19.

4. R.H.C. Moir, "Feasible Computation: Methodological Contributions of Computer Science", Physical Perspectives on Computation, Computational Perspectives on Physics (2018) 172-194.

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2. Eunice Y.S. Chan, Robert M. Corless, and Leili Rafiee Sevyeri, "Generalized Standard Triples", arXiv preprint (2020).

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32. Robert 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 31. Robert M. Corless, K Hill, C.E. Jones, S Macfie, A.J. Moehring, E Shemyakova, & L.M. Wahl, "Engaging faculty in the pedagogical literature," Conference Presentation at Western Conference on Science Education (2011).

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Other publications

2. Robert 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. Robert M. Corless, "About the Applied Math Coffee Mug Design" (1998)

Selected talks

27. Teaching Programming to Mathematical Scientists, CUNEF, Madrid, Spain, February 2020

26. Masterclass on Maple (parts I and II), Isaac Newton Institute, 2019

25. "An Old Special Function meets a (slightly) Newer One", Isaac Newton Institute, Nov 2019

24. "Bohemian Companions", MEGA 2019 plenary, Madrid, June 2019

23. "Bohemian Matrices", U. Manchester (Manchester UK, 20 June, 2018) YouTube Link

22. "Bohemian Eigenvalues", U. Alcalá (Alcalá de Henares Spain, 18 May, 2017).

21. "A new kind of companion matrix", U. Complutense (Madrid Spain, 23 May, 2017).

20. "Gamma and Factorial in the Monthly", opening plenary, ACA (Jerusalem Israel, 17 July, 2017).

19. "Approximating the Functional Inverse of Gamma", BIRS video link (Oaxaca Mexico 2016).

18. "The Lambert W Function", Celebrating 20 years of W (Western University, July 2016).

17. "Bohemian Eigenvalues", Computational Discovery (Western, 2016). YouTube Link

16. "Twenty plus years of the Lambert W. Function", International Conference on Analysis, Applications, and Computations: In Memory of Lee Lorch, Fields Institute (September 2015).

15. "Optimal Backward Error and the Leaky Bucket", ACMES (Western University, May 2015)

14. "Optimal Backward Error and the Dahlquist Test Problem", SPCOM (Newcastle AU, 2015)

13. "Computer Algebra for Experimental Mathematics", TRICS (Western, 2014)

12. "What is Experimental Mathematics?", Undergraduate Society of Applied Mathematics (Western University, October 2014)

11. "Numerical Stability of Polynomial Eigenvalue Algorithms in the Lagrange Basis," MATFUN (Manchester, UK) (April 2013).

10. "Polynomial or Rational Interpolants in the Lagrange Basis," ANODE (Auckland 2013).

9. "Defect assessment for numerical solutions of chaotic DE," MAGIC (Mistletoe Bay NZ 2012).

8. "First encounters of a Chebfun Novice," ICIAM, Vancouver (2011).

7. "Polynomial Algebra for Birkhoff Interpolants," SANUM, Stellenbosch, SA (2010).

6. "Pseudospectra of Matrix Exponential Polynomials," SNC, Kyoto, Japan (August 2009).

5. "Polynomial Algebra by Values," Special Semester on Gröbner Basis, ApCoA, Linz, Austria, (February 2006).

4. "On a Generalized Companion Matrix Pencil for Matrix Polynomials Expressed in the Lagrange Basis," SNC 2005, Xi'an, China

3. "Numerical Nonlinear Algebra," COSCOMP Conference on Scientific Computing, Vienna, Austria, (June 2005).

2. "Computer-Mediated Thinking," Invited plenary lecture at "Technology in Mathematics Education", TIME, Montreal, (July 2004).

1. "Software tools for mathematical communication," Proceedings on the Future of Mathematical Communication", Mathematical Sciences Research Institute, Berkeley, December, (1999)

Teaching

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. This changes continually as knowledge advances. This has changed radically with the introduction of the web, wide social networks, online tools including videos, and will change even more radically as AI tools take hold. Yet a second way, a possibly more important way, that a human researcher/instructor influences teaching is that a researcher is an excited learner, 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 as we know it today 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 have been in 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 8 listed above. I am particularly concerned with the ethics of teaching with AI.

I have supervised or co-supervised seventeen PhD theses, thirteen masters theses (one currently), 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.
List of PhD Students Advised:

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

2020	Leili Rafiee Sevyeri, Hybrid Symbolic-Numeric Computing in Linear and Polynomial Algebra
2019	Eunice 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:

2020–22	Aaron Asner, U. Waterloo, In progress
2019	Irene Novarinho, AIMS, Backward Error for Continued Fractions
2019	Jeet Trivedi, A Survey of Quadrature Methods for Oscillatory Integration
2016	Eunice 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 have been Scientific Director since 2015 for the Ontario Research Center for Computer Algebra (ORCCA), which 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 "Towards 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 am co-Chair with Paulina Chin of the Program Committee for the Maple Conference Nov 2–5 2021; last year I was co-Chair with Juergen

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, most recently on Bohemian Matrices and Applications at ICIAM 2019 in Valencia. I have proposed a minisymposium for SIAM 2021 with Nick Higham on the same topic.

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 will have no page charges for authors, and will be launched in June 2021.

I am a life member of CAIMS (the Canadian Applied and Industrial Mathematics Society) 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
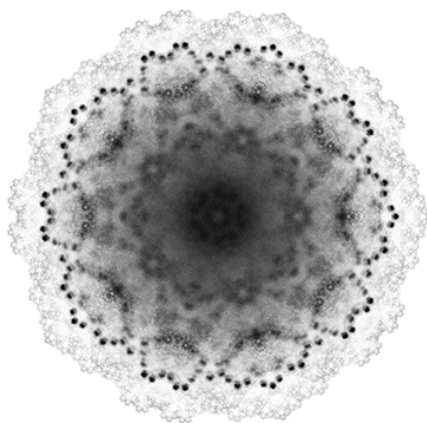
Just to have a nice picture at the end of my CV, here is a density plot of the complex eigenvalues of ten million upper Hessenberg Toeplitz matrices with population from the fifth roots of unity. See bohemianmatrices.com, the journal paper 95, or the unrefereed note 33 for more information. Image by my former PhD student Steven E. Thornton.