CURRICULUM VITAE

Prepared January 15, 2019

John M. Franks

Professional Address:

Department of Mathematics
Northwestern University
Evanston, IL 60208-2730
(847) 491-5548

Home Address:

2232 Forestview Road
Evanston IL, 60201
(847) 864-9180

Education:

1965	B.A.	Rice University
1967	M.A.	University of California, Berkeley
1968	Ph.D.	University of California, Berkeley

Employment:

1968–70	C.L.E. Moore Instructor, M.I.T.
1970–73	Assistant Professor, Northwestern University
1973–78	Associate Professor, Northwestern University
1978–	Professor, Northwestern University
2008–	Henry S. Noyes Professor of Mathematics, Northwestern University
2010–14	Associate Dean for Faculty, Weinberg College of Arts and Sciences, Northwestern University
2014–15	Senior Associate Dean for Faculty, Weinberg College of Arts and Sciences, Northwestern University

Publications:

1. Topological Conjugacy and the fundamental group, Lecture Notes of Amer. Math. Soc. Summer Institute on Global Analysis (1968).
2. Anosov Diffeomophism on Tori, Trans. Amer. Math. Soc. **145** (1969), 117–124.
3. Anosov Diffeomorphisms, in Global Analysis, Proceedings of the Symposium on Pure Mathematics **I**, Amer. Math. Soc., Providence, RI (1970), 61–93.
4. Necessary Conditions for Stability of Diffeomorphisms, Trans. Amer. Math. Soc. **158** (1971), 310–318.
5. Anosov Diffeomorphisms, Symposium on Differential Equations and Dynamical Systems, Springer Verlag Lecture Notes in Mathematics **206** (1971).
6. Ω-Stability: Diffeomorphisms and Flows, in Proceedings of the Southhampton Colloquium on Smooth Dynamical Systems (1972).
7. Differentiably Ω-stable Diffeomorphisms, Topology **11** (1972), 107–113.
8. Absolutely Structurally Stable Diffeomorphisms, Proceedings Amer. Math. Soc. **37** (1973), 293–6.

9. Time Dependent Structural Stability, Inventiones Math. **24** (1974), 163–172.

10. Morse Inequalities for Zeta Functions, Annals of Math. **102** (1975), 143–157.

11. Two Foliations in the Plane, Proceedings Amer. Math. Soc. **58** (1976), 262–4.

12. (with C. Robinson) A quasi-Anosov diffeomorphism which is not Anosov, Transactions Amer. Math. Soc. **223** (1976), 267–278.

13. Homology and the Zeta function for diffeomorphisms, Asterisque **40** (1976), 79–88.

14. (with R. Bowen) Periodic Points of Maps of the Disk and Interval, Topology **15** (1976), 337–342.

15. Some smooth maps with infinitely many hyperbolic periodic points, Transactions Amer. Math. Soc. **226** (1977), 175–179.

16. Constructing Structurally Stable Diffeomorphisms, Annals of Math. **105** (1977), 343–359.

17. Holonomy Invariant Co-chains for Foliations, Proc. Amer. Math. Soc. **62** (1977), 161–164.

18. (with R. Bowen) Homology for Zero Dimensional Non-Wandering Sets, Annals of Math. **106** (1977), 73–92.

19. Invariant Sets of Hyperbolic Toral Automorphisms, American J. Math. **99** (1977), 1089–1095.

20. Non-Singular Flows on S^3 with Hyperbolic Chain Recurrent Set, Rocky Mountain Journal of Math. **7** (1977), 539–48.

21. Manifolds of C^r Mappings with applications to Dynamical Systems, Studies in Analysis, Advances in Math. Supplementary Studies **4** (1977).

22. The dimension of basic sets, J. Differential Geometry **12** (1977), 435–441.

23. A reduced Zeta function for diffeomorphisms, American J. Math. **100** (1978), pp. 217–243.

24. The periodic behavior of non-singular Morse-Smale flows, Comment. Math. Helv. **53** (1978), 279–294.

25. The Structure of Smale Diffeomorphisms, Springer Lecture Notes in Math. **668** (1978), 117–126.

26. (with C. Narasimhan) The Periodic Behavior of Morse-Smale Diffeomorphisms, Inventiones Math. **48** (1978), 279–292.

27. Morse-Smale Flows and Homotopy Theory, Topology **18** (1979), 199–215.

28. (with M. Shub) The Existence of Morse-Smale Diffeomorphisms, Topology **20** (1981), 273–290.

29. (with P. Blanchard) The Dynamical Complexity of Orientation Reversing Homeomorphisms of Surfaces, Inventiones Math. **62** (1980), 333–339.

30. (with R. Williams) An Anomalous Anosov Flow, in Global Theory of Dynamical Systems, Springer Lecture Notes **819** (1979), 158–174.

31. Knots, Links and Symbolic Dynamics, Annals of Math. **113** (1981), 529–552.

32. Symbolic Dynamics, Homology and Knots in Global Theory of Dynamical Systems, Springer Lecture Notes **819** (1979), 146–157.

33. (with L.-S. Young) A C^2 Kupka-Smale Diffeomorphism of the Disk with no Sources or Sinks, in Dynamical Systems and Turbulence, Springer Lecture Notes **898** (1981), 90–98.

34. (with D. Asimov) Unremovable Closed Orbits, in Geometric Dynamics, Springer Lecture Notes **1007** (1983), 22–29.

35. (with P. Blanchard) An Obstruction to Certain Dynamics in Surface Diffeomorphisms, Ergodic Theory and Dynamical Systems **I** (1981), 255–260.

36. *Homology and Dynamical Systems*, CBMS Regional Conference Series **49** (1982), 120 pages.

37. Symbolic Dynamics in Flows on Three-manifolds, Transactions Amer. Math. Soc. **279** (1983), 231–236.

38. Flow equivalence of Subshifts of Finite Type, Ergodic Theory and Dynamical Systems **4** (1984), 53–66.

39. Non-singular Smale Flows on S^3 Topology, **24** (1985), 265–282.

40. Period Doubling and the Lefschetz Formula, Trans. Amer. Math. Soc. **287** (1985), 275–283.

41. (with R.F. Williams) Entropy and Knots, Transactions Amer. Math. Soc. **291** (1985), 241–253.

42. (with M. Handel) Entropy and exponential growth of π_1 in dimension two, Proc. of the Amer. Math. Soc. **102** (1988), 753–760.

43. (with R.F. Williams) Braids and the Jones-Conway polynomial, Trans. of the Amer. Math. Soc. **303** (1987), 97–108.

44. Recurrence and Fixed Points of Surface Homeomorphisms, Ergodic Theory and Dynamical Systems **8*** (1988), 99–107.

45. (with S. Fisher) The Fixed Points of an Analytic Self-Mapping, Proceedings of the Amer. Math. Soc. **99** (1987), 76–78.

46. Generalizations of the Poincaré-Birkhoff Theorem, Annals of Math. **128** (1988), 139–151.

47. A Variation on the Poincaré-Birkhoff Theorem, in "Hamiltonian Dynamics," Contemporary Math., Amer. Math. Soc. **81** (1988), 111–117.

48. (with M. Boyle and B. Kitchens) Automorphisms of one-sided subshifts of finite type, Ergodic Theory and Dynamical Systems. **10** (1990), 421-449.

49. Realizing Rotation Vectors for Torus Homeomorphisms, Trans. Amer. Math. Soc. **311** (1989), 107–115.

50. (with D. Fried) The Lefschetz function of a point, Springer Lecture Notes **1411** (1989), 83–87.

51. (with M. Misiurewicz) Rotation Sets of Toral Flows, Proc. Amer. Math. Soc. **109** (1990), 243–249.

52. (with J. Llibre) Periods of Surface Homeomorphisms, Contemporary Math. **117** (1991) 63–77.

53. Periodic Points and Rotation Numbers for Area Preserving Diffeomorphisms of the Plane, Publications Math. IHES **71** (1990), 105–120.

54. (with M. Barge) *Recurrent Sets for Planar Homeomorphisms* in "From Topology to Computation: Proceedings of the Smalefest" Hirsch, Marsden, and Shub eds. pp. 186-195 Springer Verlag, N.Y.

55. A New Proof of the Brouwer Plane Translation Theorem, Ergodic Theory and Dynamical Systems, **12** (1992), 217–226.

56. Rotation numbers for Area Preserving Homeomorphisms of the Open Annulus, in Proceedings of the International Conference Dynamical Systems and Related Topics, K Shiraiwa, ed. World Scientific (1991), 123–128.

57. Geodesics on S^2 and Periodic Points of Annulus Homeomorphisms, *Inventiones Math.* **108** (1992), 403–418.

58. (with M. Misiurewicz) Cycles for disk homeomorphisms and thick trees, *Contemporary Math.* **152** (1993), 69–139.

59. The Rotation Set and Periodic Points for Torus Homeomorphisms, *Dynamical Systems and Chaos.* Aoki, Shiraiwa, and Takahashi ed. World Scientific, Singapore, (1995), 41–48.

60. Rotation vectors of area preserving surface diffeomorphisms. Proceedings of the ICM 1994. **2** (1995), 1179–1186. Birkhäuser Verlag, Basel

61. Rotation Vectors and Fixed Points of Area Preserving Surface Diffeomorphisms, *Trans. Amer. Math. Soc.* **348** (1996), 2637–2662.

62. Area Preserving Homeomorphisms of Open Surfaces of Genus Zero, New York Jour. of Math. **2** (1996) 1-19.

63. (with M. C. Sullivan) Flows with Knotted Closed Orbits in "Handbook of Geometric Topology," Daverman and Sher eds. North Holland (2002) 477–497.

64. (with E. Rykken) Pseudo-Anosov Homeomorphisms with Quadratic Expansion, *Proc. Amer. Math. Soc.* **127** (1999), 2183-2192.

65. The Conley index and non-existence of minimal homeomorphisms, Illinois Journal of Math. **43** (1999) 457-64.

66. (with D. Richeson) Shift Equivalence and the Conley index Trans. Amer. Math. Soc. **352** (2000) 3305–3322.

67. (with M. Misiurewicz) Topological Methods in Dynamics in "Handbook of Dynamical Systems vol. 1A" Hasselblatt and Katok eds. North Holland (2002) 547–597.

68. (with Patrice Le Calvez) Regions of instability for non-twist maps. Ergodic Theory and Dynamical Systems, **23** (2003) 111-141.

69. (with Benson Farb) Group actions on one-manifolds, I: Actions of Non-linear Groups, arXiv DS/0107085 submitted

70. (with Benson Farb) Group actions on one-manifolds, II: Extensions of Hölder's Theorem Trans. Amer. Math. Soc. **355** (2003) 4385-4396.

71. (with Benson Farb) Groups of homeomorphisms of one-manifolds, III: Nilpotent subgroups, Ergodic Th. and Dyn. Sys. **23** (2003) 1467–1484.

72. (with Michael Handel) Periodic Points of Hamiltonian Surface Diffeomorphisms, Geom. Topol. **7** (2003) 713-756.

73. (with Michael Handel) Area preserving group actions on surfaces. Geom. Topol. **7** (2003) 757-771

74. Rotation Numbers and Instability Sets, Bull. Amer. Math. Soc. **40** (2003) 263-279.

75. (with Christian Bonatti) A Hölder continuous vector field tangent to many foliations, in *Modern Dynamical Systems and Applications*, Brin, Hasselblatt, and Pesin, eds. Cambridge Univ. Press, 2004.

76. (with Michael Handel) Distortion Elements in Group actions on surfaces *Duke Math. Jour.* **131** (2006) 441-468.

77. Distortion in Groups of Circle and Surface Diffeomorphisms in *Dynamique des diffeomorphsmes conservatifs des surfaces: un point de vue topologique, Societé Mathématique de France*, no. 21 (2006), 35–52.

78. (with Michael Handel, and Kamlesh Parwani) *Fixed Points of abelian actions on S^2,* Ergod. Th. & Dyn. Sys. **27** (2007) 1557–1581.

79. (with Michael Handel, and Kamlesh Parwani) *Fixed Points of abelian actions,* Journal of Modern Dynamics **1**, no.3 (2007) 443–464.

80. (with Michael Handel) *Complete semi-conjugacies for psuedo-Anosov homeomorphisms,* available on the ArXiv at http://front.math.ucdavis.edu/0712.3069

81. (with Michael Handel) *Global fixed points for centralizers and Morita's Theorem,* Geometry and Topology, **1**3 (2009) 87–98.

82. Cantor's other proofs that $\mathbb{R}$ is uncountable, *Math. Mag.* **83** (2010), no. 4, 283–289.

83. (with Michael Handel) *Entropy zero area preserving diffeomorphisms of S^2* Geometry & Topology **16** (2012) 21872284

84. (with Michael Handel) *Triviality of some representations of $MCG(S_g)$ in $GL(n,\mathbb{C}), Diff(S^2)$ and $Homeo(\mathbb{T}^2)$* Proc. Amer. Math. Soc. **141** (2013), no. 9, 2951–2962.

85. (with Michael Handel) *Centralizers and other virtually abelian subgroups of* $\mathrm{Symp}^{\omega}_{\mu}(S^2)$. Jour. Modern Dynamics **7** (2013) no. 3, 369 – 394.

86. Rotation Numbers for S^2 diffeomorphisms in A.M.S. Contemporary Math. **692** memorial volume for D.V. Anosov.

87. Zero entropy subgroups of mapping class groups (with K. Parwani) Geom. Dedicata **186** (2017), 27–38.

88. The spacetime of a shift automorphism (with Van Cyr and Bryna Kra) Trans. Amer. Math. Soc. **371** (2019), no. 1, 461-488. DOI: https://doi.org/10.1090/tran/7254

89. Distortion and the automorphism group of a shift (with Van Cyr, Bryna Kra and Samuel Petite) Jour. Modern Dynamics **13** (2018) 147-161. DOI: 10.3934/jmd.2018015

Selected Addresses:

Invited Sectional address, International Congress of Mathematicians, Zurich, 1994.

Invited Plenary Address AMS Summer Mathematics Institute 1999.

Invited Lecture Series (approx 8 lectures) Chinese University of Hong Kong, 2000

Invited Plenary Address International Conference on Dynamical Systems, IMPA, Rio de Janeiro, Brazil, 2000.

Invited Plenary Address International Conference on Dynamical Systems, Peking University, Beijing China, 2001

Invited Plenary Address, Annual Meeting of the Amer. Math. Soc. San Diego, CA, 2002.

Invited lecture series, (3 lectures) "Dynamique des difféomorphismes conservatifs des surfaces", Dijon, France Jul 2004.

Invited lecture series, (10 lectures) "Recent Trends in Nonlinear Science", Castellon, Spain, 2005.

Invited plenary address at conference titled "From Dynamical Systems to Symplectic Topology," ETH, Zurich, Nov.2010.

Membership:

American Mathematical Society

Courses Taught:

2008–2009	230	Multivariable calculus
	410-1	Real Analysis
2009–2010	On Leave	
2010–2011	306	Combinatorics
2011–2012	321-3	Real Analysis
2012–2013	321-3	Real Analysis
2014–2015	291-1	Linear Algebra

Visiting Appointments

1972	Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette, France (Fall)
1975–76	Instituto de Matematica Pura e Aplicada, Rio de Janeiro, Brazil I.H.E.S., Bures-sur-Yvette, France Centro de Investigacion del IPN, Mexico City, Mexico
1983	I.H.E.S., Bures-sur-Yvette, France (January–June)
1984	Math. Sci. Research Institute, Berkeley (March–June)
1985	I.H.E.S. Bures-sur-Yvette, France (June–August)
1994	Institut Henri Poincaré, Paris (June–August)
1998	Université de Paris 13 (June–July)
2009	Université de Paris 6 (October)

Professional Activities

Editor, Ergodic Theory & Dynamical Systems 1988–92
Editor, Ergodic Theory & Dynamical Systems 1997–2002
Editorial Board, Ergodic Theory & Dynamical Systems 2002–2014
Member American Mathematical Society committee on committees 1991–2
Chairman American Mathematical Society central section program committee 1992
Chairman American Mathematical Society Committee on Electronic Products and Services 1992–4
Member Executive Committee of the American Mathematics Soc. 1993–97
Member-at-large Council of the American Mathematics Soc. 1991–97
Member of the board of governors of the Geometry Center, a National Science and Technology Research Center at the University of Minnesota 1994–6 (chair 1996)
Member Long Range Planning Committee of the AMS (1993–5) (chair 1995)
Member Committee on Publications of the AMS 1993–1995
Member, NSF Mathematical Sciences panel on awards in dynamical systems and ergodic theory, March 1996.
Member, NSF Mathematical Sciences panel on awards in dynamical systems and ergodic theory, February 1997
Member, International Mathematical Union committee on Electronic Publishing
Chair, panel to select speakers for section 9 (dynamical systems) of the 1998 International Congress of Mathematics.
Member, NSF Mathematical Sciences panel on awards in dynamical systems and ergodic theory, February 1999
Treasurer of the Amer. Math. Soc. and member of the Board of Trustees 1999–2011
Associate Treasurer of the Amer. Math. Soc. and member of the Board of Trustees 2011–2012.
Fellow of the American Mathematical Society 2013 –

NU Committees

2002-3	Program Review Subcommittee on Information Technology
2003-4	member WCAS ad hoc promotion/tenure Committees
2002-2004	member University Research Grants Committee
2004-2007	member University Program Review Council
2005-6	member WCAS ad hoc promotion/tenure Committees

Recent Departmental Service

Personnel Committee 1999–2000

Budget Committee 02–03, 04–05, 06–07, 16–17.

Graduate Committee 1993–99, 2004 (chair 1996–98).

Chair of the Department 2006–9.

WCAS Service

Associate Dean for Faculty 2010–2014

Senior Associate Dean for Faculty 2014–2015