

MARY LOU ZEEMAN: CURRICULUM VITÆ

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Wells Johnson Professor of Mathematics

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Research Interests: Dynamical Systems, Mathematical Biology including Ecology, Sustainability, Resilience, Neuroscience and Neuroendocrinology,.

Education

Oxford University, U.K., B.A. Hons. Mathematics, Somerville College, 1984; M.A. Mathematics, 1989.
University of California, Berkeley, Ph.D. Mathematics, 1989; Advisor Moe Hirsch.

Appointments

Bowdoin College, Brunswick, ME

Wells Johnson Professor of Mathematics, 2007-Present; *Visiting Professor*, Fall 2006.

Cornell University, Ithaca, NY,

Visiting Scientist, Applied Math, 2002; *Neurobiology & Behavior*, 2003-04 & Springs 2005-10

University of Michigan, Mathematics Dept., Ann Arbor, MI, *Visiting Associate Professor*, 2000-01.

U.T. San Antonio (UTSA), TX,

Professor, Applied Mathematics, 2004-2006, cross appointment with Biology, 2005-2006.

Associate Professor, Mathematics, 1995-2004; *Assistant Professor*, Mathematics, 1991-1995.

Massachusetts Institute of Technology, Cambridge, MA, *C.L.E. Moore Instructor*. 1990-1991

Institute for Mathematics and its Applications, Minneapolis, MN, *Postdoctoral Member*, 1989-1990

Leadership in Mathematics of Climate and Sustainability

- Co-Founder and Co-Director: *Mathematics & Climate Research Network*. mcrn.hubzero.org 2010-pres.
- Co-Founder and Deputy Director: *Institute for Computational Sustainability* and Executive Committee: *Computational Sustainability Network* www.compsust.net 2008-pres.
- Core leadership team: *Mathematics of Planet Earth 2013 Initiative* and Co-Founder, and inaugural Vice-Chair of *SIAM Activity Group on Mathematics of Planet Earth (SIAG/MPE)*, 2014-201.
- Joint organization of over 50 conferences, workshops, summer schools and minisymposia on Mathematics, Biology, Climate and Sustainability.

Outreach Activities. Regular public lectures on Mathematics in Biology, Climate and Resilience, including at the 2017 and 2019 National Mathematics Festivals in Washington D.C.

Selected Bibliography *Order of authorship is alphabetical unless otherwise listed.*

Graduate student coauthors are marked by *, undergraduates by ♦, and high school students by ♦♦.

1. With A. Mills: *Ruthenium dioxide hydrate, is it a redox catalyst?* Journal of the Chemical Society, Chemical Communications. (1981) 948-50.
2. *Hopf bifurcations in competitive three-dimensional Lotka-Volterra systems.* Dynamics and Stability of Systems. 8 (1993) 189-217.
3. With E. C. Zeeman: *On the convexity of carrying simplices in competitive Lotka-Volterra systems.* Differential Eqns, Dynamical Systems & Control Science. Marcel Dekker, Inc., NY. (1993) 353-364.
4. *Geometric methods in population dynamics.* Proc. Symposium Comparison Methods & Stability Theory. Marcel Dekker, Inc., NY. (1994) 339-347.
5. *Extinction in competitive Lotka-Volterra systems.* Proceedings of the American Mathematical Society. 123 (1995) 87-96.
6. With F. Montes de Oca: *Balancing survival and extinction in nonautonomous comp. Lotka-Volterra systems.* Journal of Mathematical Analysis and Applications. 192 (1995) 360-370.

7. With F. Montes de Oca: *Extinction in nonautonomous competitive Lotka-Volterra systems*. Proceedings of the American Mathematical Society. 124 (1996) 3677–3687.
8. *On directed periodic orbits in three-dimensional competitive Lotka-Volterra systems*. Proc Int'l Conf DEs & Applications to Biology & to Industry. World Scientific, Singapore, (1996) 563–572
9. With J. A. Pace*: *A bridge between the Bendixson-Dulac criterion in R^2 and Liapunov functions in R^n* . Canadian Applied Mathematics Quarterly. 6 (1998) 189–193.
10. With P. van den Driessche: *Three dimensional competitive Lotka-Volterra systems with no periodic orbits*. SIAM Journal on Applied Mathematics. 58 (1998) 227–234.
11. With M. Farkas and P. van den Driessche: *Bounding the number of cycles of O.D.E.'s in R^n* . Proceedings of the American Mathematical Society. 129 (2001) 443–449.
12. With E. C. Zeeman: *An n -dimensional competitive Lotka-Volterra system is generically determined by the edges of its carrying simplex*. Nonlinearity. 15 (2002) 2019–2032.
13. With E. C. Zeeman: *From local to global dynamics in competitive Lotka-Volterra systems*. Transactions of the American Mathematical Society. 355 (2003) 713–734.
14. M.L. Zeeman, D. Gokhman and W. Weckesser: *Resonance in the menstrual cycle: a new model of the LH surge*. Reproductive Biomedicine Online. 7 (2003) 295–300.
15. With P. van den Driessche: *Disease induced oscillations between two competing species*. SIAM Journal on Applied Dynamical Systems. 3 (2005) 601–619.
16. J. H. Tien*, D. Lyles* and M.L. Zeeman: *A potential role of modulating inositol 1,4,5-triphosphate receptor desensitization and recovery rates in regulating ovulation*. J. Theor Bio. 232 (2005) 105–117.
17. J. T. King*, P. Lovell, M. Rishniw, M. I. Kotlikoff, M.L. Zeeman and D. P. McCobb: *β_2 and β_4 Subunits of BK Channels Confer Differential Sensitivity to Acute Modulation by Steroid Hormones*. J. Neurophysiology. 95 (2006) 2878 – 2888.
18. O. Chatterjee, L.A. Taylor*, S. Ahmed*, S. Nagaraj*, J.J. Hall, S.M. Finckbeiner*, P.S. Chan*, N. Suda*, J.T. King*, M.L. Zeeman and D.P. McCobb: *Social stress alters expression of BK potassium channel subunits in mouse adrenal medulla and pituitary glands*. J. Neuroendocr. 21 (2009) p167–76.
19. D. Lyles*, J.H. Tien*, D.P. McCobb and M.L. Zeeman: *Pituitary network connectivity as a mechanism for the luteinising hormone surge*. J. Neuroendocrinology. 22 (2010) p1267–1278.
20. A.-A. Yakubu, N. Li*, J.M. Conrad and M.L. Zeeman: *Constant proportion harvest policies: dynamic implications in the pacific halibut and atlantic cod fisheries*. Math. Biosci. 232 (2011) 66–77
21. A.H. Williams*, M.A. Kwiatkowski*, A.L. Mortimer*, E. Marder, M.L. Zeeman, and P.S. Dickinson: *Animal-to-animal variability in the phasing of the crustacean cardiac motor pattern: an experimental and computational analysis*. J. Neurophysiology. 109 (10) (2013) 2451–2465. E-pub Feb 2013. DOI: 10.1152/jn.01010.2012
22. *Mathematics, Sustainability, and a Bridge to Decision Support*, MPE 2013 Guest Editorial, The College Mathematics Journal, 44 (2013) 346–349.
23. With D.P. McCobb: *Bridging between Experiments and Equations: A Tutorial on Modeling Excitability*, in *Computational Neuroendocrinology*, D McGregor & G Leng (Eds.), Wiley-INF Masterclass in Neuroendocrinology Series. (2016) 1–79.
24. M.L. Zeeman, K. Meyer*, E. Bussmann**, A. Hoyer-Leitzel, S. Iams, I.J. Klasky*, V. Lee* and S. Ligtenberg*: *Resilience of socially valued properties of natural systems to repeated disturbance: a framework to support value-laden management decisions*. Natural Resource Modeling. 31 (3) (2018). DOI: 10.1111/nrm.12170
25. A. Hastings, K.C. Abbott, K. Cuddington, T. Francis, G. Gellner, Y.-C. Lai, A. Morozov, S. Petrovskii, K. Scranton and M.L. Zeeman: *Transient phenomena in ecology*. Science. 361 (2018). DOI: 10.1126/science.aat6412
26. K. Meyer*, A. Hoyer-Leitzel, S. Iams, I.J. Klasky*, V. Lee*, S. Ligtenberg*, E. Bussmann** and M.L. Zeeman: *Quantifying resilience to recurrent ecosystem disturbances using flow-kick dynamics*. Nature Sustainability. 1 (2018) 671–678. DOI: 10.1038/s41893-018-0168-z

27. M.L. Zeeman, K. Meyer*, E. Bussmann*, A. Hoyer-Leitzel, S. Iams, I.J. Klasky*, V. Lee* and S. Ligteneberg*: *Resilience of socially valued properties of natural systems to repeated disturbance: a framework to support value-laden management decisions*. *Natural Resource Modeling*. 31 (3) (2018). DOI: 10.1111/nrm.12170
28. C Gomes et al (33 authors). *Computational sustainability: Computing for a better world and a sustainable future*. *Communications of the ACM* 62 (9) (2019), 56-65. DOI: 10.1145/3339399
29. A. Morozov, K. Abbott, K. Cuddington, T. Francis, G. Gellner, A. Hastings, Y.-C. Lai, S. Petrovskii, K. Scranton and M. L. Zeeman: *Long transients in ecology: theory and applications*. *Physics of life reviews*. 32 (2020) 1-40. DOI: 10.1016/j.plrev.2019.09.004