Curriculum Vitae for Mary Margaret Ballyk
November 2022

Department of Mathematical Sciences
New Mexico State University
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Career History

Associate Professor, New Mexico State University Fall 2008 to present
Assistant Professor, New Mexico State University Fall 2003 to Fall 2008
College Assistant Professor, New Mexico State University Spring 2000 to Fall 2003
NSERC Postdoctoral Fellow Arizona State University 1996-1998
Lecturer in Mathematics Vanderbilt University 1993

Degrees Earned

Ph.D. Mathematics, McMaster University December 1994
M.Sc. Mathematics, McMaster University August 1989
Hon. B.Sc. Mathematics, Brock University July 1987

Scholarships, Awards

1. Recipient: Westhafer Award for Excellence in Teaching, August 2021
   The Westhafer Award is presented in alternating years for excellence in teaching or in research and creative activity. It is the highest award at NMSU for teaching or for research and creative activity.
2. Recipient: Outstanding Faculty Achievement Award in Teaching. College of Arts and Science. (April 2021).
3. Recipient: Outstanding Faculty Achievement Award in Teaching, College of Arts and Sciences. (April 2015).
4. Recipient of the Donald C. Roush Award for Excellence in Teaching. (2008)
5. Nominated for the 2006-2007 Patricia Christmore Teaching award
6. One if five finalists for the 2005-2006 Patricia Christmore Teaching award
7. ADVANCE Institutional Transformation Award, Spring 2005.
8. The 8th Bellman Prize for the best paper published in Mathematical Biosciences for the two-year period 1998-1999, with Dr. Hal Smith of Arizona State University. See Publication #8. Announcement appears in Mathematical Biosciences (2002) 179: 219-221.
9. NSERC Postdoctoral Fellowship 1994-1996, tenured 1996-1998
10. Ontario Graduate Scholarship 1992-1993
11. Ontario Graduate Scholarship 1991-1992
12. NSERC Postgraduate Scholarship 1989-1991
13. McMaster Graduate Student Teaching Assistant Excellence Award 1990-1991
14. McMaster Graduate Student Teaching Assistant Excellence Award 1988-1989
15. NSERC Undergraduate Student Research Award 1986-87

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Research Interests

My principal interest is in mathematical models of complex biological and ecological systems. In particular, my research has involved the development and analysis of systems of differential equations that model species interaction under nutrient limitation. In addition to numerical techniques, I use analytical methods to obtain information about the qualitative behavior of the models; more recently I have begun to apply control theory to these models.

Publications

1. H. D. Curtsinger, X. Zeng, M. Ballyk, T. Phan, B. Niu, M.Y. Bartee, J. Paul Tian, E. Bartee, 2022 "High levels of extracellular potassium can inhibit myxoma virus replication by preventing 2 release of virions from the endosomes" Journal of Virology, accepted.

2. M. Ballyk, I. Jawarneh, R. Staffeldt, 2020 "A Nutrient-Prey-Predator Model: Stability and Bifurcations", *Discrete & Continuous Dynamical Systems - S/American Institute of Mathematical Sciences,* 13(11). https://www.aimsciences.org/article/doi/10.3934/dcdss.2020192

3. M. Ballyk, Wolkowicz, G.S.K., 2011 "Classical and resource-based competition: A unifying graphical approach," *Journal of Mathematical Biology*. 62:81-109.

4. M. Ballyk, E. Barany, "Stabilization of chemostats using feedback linearization and reduction of dimension." Proceedings of the 2009 American Control Conference, June 10-12, 2009, 2313-2318.

5. M. Ballyk, E. Barany, "The role of resource type in the control of chemostats using feedback linearization," Ecological Modeling 211: 25-35 (2008)

6. M. Ballyk, D. Jones, H. Smith, "The Biofilm Model of Freter: a review," in *Structured Population Models in Biology and Epidemiology*, Lecture Notes in Mathematics (Mathematical Biosciences Subseries) P. Magal, S. Ruan (eds.) Springer-Verlag, Volume 1932, 265-302 (2008)

7. H. Noussi, M. Ballyk, E. Barany, "Stabilization of chemostats using feedback linearization." Proceedings of the 46th IEEE Conference on Decision and Control, December 10-11, 2007, 677-682.

8. M. Ballyk, E. Barany, "The role of resource types in the control of chemostats using feedback linearization," Proceedings of the 26th American Control Conference, July 11-13, 2007.

9. M. Golinski, E. Barany, M. Ballyk, "Ecological conditions that favor the evolution of intermediate virulence in an environmentally transmitted parasite," Journal of Mathematical Biology 51: 389-402 (2005)

10. M. Ballyk, C.C. McCluskey, G.S.K. Wolkowicz, "Global analysis of competition for perfectly substitutable resources with linear response," Journal of Mathematical Biology 51: 458-490 (2005)

11. M.M. Ballyk, D.A. Jones, H.L. Smith, "Microbial competition in reactors with wall attachment: A mathematical comparison of chemostat and plug flow models," *Microbial Ecology* 41: 210-221 (2001)

Publications (Cont'd)

13. M.M. Ballyk, H.L. Smith, "A model of microbial growth in a plug flow reactor with wall attachment," *Mathematical Biosciences* 158:95-126 (1999).

14. M.M. Ballyk, H.L. Smith, "A flow reactor with wall growth," in *Mathematical Models in Medical and Health Science,* ed. M. Horn, G. Simonett, G. Webb, Vanderbilt University Press, Nashville (1998).

15. M.M. Ballyk, D. Le, D.A. Jones, H.L. Smith, "Effects of random motility on microbial growth and competition in a flow reactor," *SIAM Journal on Applied Mathematics* 59:573-596 (1998).

16. G.S.K. Wolkowicz, M.M. Ballyk, Zhiqi Lu, "Microbial dynamics in a chemostat: Competition, growth, implications of enrichment," in *Differential Equations and Control Theory,* Proc. of Int. Conf. on Differential Equations and Control Theory, Wuhan, China, ed. Z. Deng et al, Marcel Dekker, Inc., New York (1996).

17. M.M. Ballyk, G.S.K. Wolkowicz, "An examination of the thresholds of enrichment: A resource-based growth model," *Journal of Mathematical Biology* 33:435-457 (1995).

18. G.S.K. Wolkowicz, M.M. Ballyk, S.P. Daoussis, "Interaction in a chemostat: Introduction of a competitor can promote greater diversity," *Rocky Mountain Journal of Mathematics* 25:515-543 (1995).

19. M.M. Ballyk, G.S.K. Wolkowicz, "Exploitative competition in the chemostat for two perfectly substitutable resources," *Mathematical Biosciences* 118:127-180 (1993)