

# Timothy C. Reluga

## Contact Information

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## Professional History

Assistant Professor of Mathematics at Pennsylvania State University, member of the Center for Infectious Disease Dynamics (July, 2007 - present)

Postdoctoral Researcher at Los Alamos National Lab (September, 2006 - June, 2007 )

Research Fellow in Epidemiology and Public Health at Yale (October, 2004 - May, 2006 )

Ph.D. in Applied Mathematics, supervised by Prof. Mark Kot,  
University of Washington, Seattle, WA (June, 2004),  
“Results on Temporal and Spatial Heterogeneity in Theoretical Ecology”

VIGRE Graduate Fellow, University of Washington  
(September, 2001 - June, 2003)

Graduate Student, Teaching Assistant, and Lecturer at the University of Washington  
(September, 1998 - June, 2004)

B.S. with majors in Biology and Mathematics,  
Tufts University, Medford, MA (June, 1998)

## Publications

T. Reluga and A. Galvani. *A general approach to population games with application to vaccination*. Mathematical Biosciences, 2011, volume 230(2), 67-78. [doi:10.1016/j.mbs.2011.01.003](https://doi.org/10.1016/j.mbs.2011.01.003)

D. M. Cornforth, T. C. Reluga, E. Shim, C. T. Bauch, A. P. Galvani, and L. A. Meyers. *Erratic flu vaccination emerges from short-sighted behaviour in contact networks* PLOS Computational Biology, 2010, volume 7(1): e1001062. [doi:10.1371/journal.pcbi.1001062](https://doi.org/10.1371/journal.pcbi.1001062)

T. Reluga. *Game theory of social distancing in response to an epidemic*. PLOS Computational Biology, 2010, volume 6 (5): e1000793. [doi:10.1371/journal.pcbi.1000793](https://doi.org/10.1371/journal.pcbi.1000793)

T. Reluga. *Branching processes and non-commuting random variables in population biology*. Canadian Applied Math Quarterly Quarterly, 2009, volume 17 (2), 387. [Link](#)

T. Reluga. *An SIS epidemiology game with two subpopulations*. Journal of Biological Dynamics, 2009, volume 3, 515-531. [doi:10.1080/17513750802638399](https://doi.org/10.1080/17513750802638399)

T. Reluga, J. Medlock, and A. Galvani. *The discounted reproductive number for epidemiology*. Mathematical Biosciences and Engineering, 2009, volume 6, 377-393. [doi:10.3934/mbe.2009.6.377](https://doi.org/10.3934/mbe.2009.6.377)

T. Reluga, H. Dahari, and A. S. Perelson. *Analysis of hepatitis C virus infection models with hepatocyte homeostasis*. SIAM Journal of Applied Mathematics, 2009, volume 69, 999-1023. [doi:10.1137/080714579](https://doi.org/10.1137/080714579)

T. Reluga, J. Medlock, and A. S. Perelson. *Backward bifurcations and multiple equilibria in epidemic models with structured immunity*. Journal of Theoretical Biology. May 2008, volume 252, 155-165. [doi:10.1016/j.jtbi.2008.01.014](https://doi.org/10.1016/j.jtbi.2008.01.014)

- T. Reluga, D. B. Walton, R. Meza, and A. Galvani. *Reservoir interactions and emerging infectious diseases*. Theoretical Population Biology, November 2007, volume 72, 400-408. doi:10.1016/j.tpb.2007.07.001
- T. Reluga, J. Medlock, E. Poolman, and A. Galvani. *Optimal timing of disease transmission in an age-structured population*. Bulletin of Mathematical Biology, November 2007, volume 69, 2711-2722. doi:10.1007/s11538-007-9238-5
- T. Reluga and J. Medlock. *Resistance mechanisms matter in SIRS models*. Mathematical Biosciences and Engineering, July 2007, volume 4, 553-563. [Link](#)
- A. Galvani, T. Reluga, and G. Chapman. *Long-standing influenza vaccination policy is in accord with individual self-interest but not with the utilitarian optimum*. Proceedings of the National Academy of Sciences of the United States, March 27, 2007, volume 104, 5692-5697. doi:10.1073/pnas.0606774104
- T. Reluga, C. Bauch, and A. Galvani. *Evolving public perceptions and stability in vaccine uptake*. Mathematical Biosciences, November 2006, volume 204, 185-198. doi:10.1016/j.mbs.2006.08.015
- T. Reluga, J. Medlock, and A. Galvani. *A model of spatial epidemic spread when individuals move within overlapping home ranges*. Bulletin of Mathematical Biology, February, 2006, volume 68, 401-416. doi:10.1007/s11538-005-9027-y
- T. Reluga. *On antibiotic cycling and optimal heterogeneity*. Mathematical Medicine and Biology, March 18, 2005, volume 22, 187-208. doi:10.1093/imammb/dqi002
- T. Reluga and S. Viscido. *A model for the evolution of selfish herd behavior*. Journal of Theoretical Biology, January 2005, volume 234, 213-225. doi:10.1016/j.jtbi.2004.11.035
- H. Qian and T. Reluga. *Nonequilibrium thermodynamics of a nonlinear biochemical switch in a cellular signaling process*. Physical Review Letters, January 21, 2005, article 028101. doi:10.1103/PhysRevLett.94.028101
- M. Kot, J. Medlock, T. Reluga, and D. B. Walton. *Stochasticity, invasions, and branching random walks*. Theoretical Population Biology, November 2004, volume 66, 175-184. doi:10.1016/j.tpb.2004.05.005
- T. Reluga. *Analysis of periodic growth-disturbance models*. Theoretical Population Biology, September 2004, volume 66, 151-161. doi:10.1016/j.tpb.2004.05.003
- T. Reluga. *A two-phase epidemic driven by diffusion*. Journal of Theoretical Biology, July 2004, volume 229, 249-261. doi:10.1016/j.jtbi.2004.03.018

## Selected Talks

- Linear models of antibiotic cycling. (Fields Institute, July 6, 2010)
- Mathematical Biology and It's Relationship to Social Planning and Public Policy. (Clemson University, April 9, 2010)
- Accounting for self-interest in the public-health management of infectious diseases. (University of West Virginia Department of Biology, September 21, 2009)
- Discounted Reproduction Numbers. (University of Utah Department of Mathematics, November 21, 2008)
- The Effects of Life History on Risky Behavior Choice and Disease Transmission (SMB Annual Meeting, Toronto, August 1, 2008)
- A Homeostasis Hypothesis for Hepatitis C (Fred Hutchinson Cancer Research Center, April 9, 2008)
- Resistance, Immunity, and Bifurcations in Epidemiology (PIMS Disease Dynamics 2008 meeting, April 4, 2008)

The Theory of Population Games and Their Applications to Public Health (Yale School of Public Health, January 24, 2008)

Population Games for Vaccination and Epidemiology (DIMACS Workshop on Game Theoretic Approaches to Epidemiology and Ecology, October 15, 2007)

Modeling Influenza Vaccine Choice (Canadian Mathematical Society-MITACS Joint Conference, June 1, 2007)

Modeling Ecological Invasions (Yale Institute for Biospheric Studies, October 14, 2005)

Perspectives on Optimizing Vaccination Policies (DIMACS Workshop on Evolutionary Considerations in Vaccine Use, June 28, 2005)

## Community Activities

National Academy of Science Expert Review Committee on Evaluation of a Site Specific Risk Assessment for the Department of Homeland Security's Planned National Bio- and Agro-Defense Facility in Manhattan, Kansas. (2010) [Link](#)

National Academy of Science Expert Review Committee for Evaluation of the Health and Safety Risks of the New USAMRIID High Containment Facilities at Fort Detrick, Maryland (2009-2010) [Link](#)

Articles reviewed for journals including *American Naturalist*, *Advances in Complex Systems*, *Applied Mathematical Modeling*, *Bulletin of Mathematical Biology*, *Journal of Applied Ecology*, *Journal of Biology*, *Journal of Biological Dynamics*, *Journal of Difference Equations and Applications*, *Journal of the Indian Mathematical Society*, *Journal of Theoretical Biology*, *Lancet*, *Mathematical Biosciences*, *Mathematical Biosciences and Engineering*, *Mathematical Medicine and Biology*, *Mathematical and Computer Modeling*, *Population Ecology*, *PLOS Computational Biology*, *PLOS One*, *PNAS*, *Proceedings of the Royal Society B*, *SIAM Journal on Applied Mathematics*, *Theoretical Population Biology*, *Vaccine*, and conference proceedings.

National grant review panels

Co-organized the CIDD workshop for Control and Management of Infectious Diseases

Organizer of "Game-Theory Approaches in Epidemiology" minisymposium at SMB'08.

Organizer of "Modeling the Within-Host Dynamics of Viral Infections" minisymposium at SIAMLS'08.

Co-organizer for DIMACS *Game Theoretic Approaches to Epidemiology and Ecology* Workshop, October, 2007.

*Disease Mechanisms in the Human Body* minisymposium organizer at SIAM'06.

Organizer of the Theoretical Immunology Journal Club at LANL (September, 2006 - March, 2007).

Co-Organizer of the UW Mathematical Ecology Journal Club (October, 2002 - June, 2004)

Co-Founder and Treasurer of the SIAMUW (August, 2003 - July, 2004)

UW Graduate and Professional Student Senator (Fall, 2002 - Spring, 2004)

## Service at Penn State

Department of Mathematics Computer Committee (2009 - present)

Revision of Long Course Descriptions for Undergraduate Mathematics Courses (2008)

Graduate Teaching and Advising Oversight Committee (Spring, 2008)

Postdoctoral supervisor of Jing Li (August, 2010 - present)

Doctoral Committees of Vitaliy Gyrya (2010), Jennie Lavine, Assieh Moghaddam, Tyler Pettay, and Lindsay McLean Beck-Johnson.

Undergraduate research advising of Galen Lynch, Natalie Gonzalez, Michael Roy, Brendan McVeigh, and Ryan Bradley.

## **Professional Society Memberships**

Society for Mathematical Biology (SMB, since 2001)

Society for Industrial and Applied Mathematics (SIAM, since 2001)

Mathematical Association of America (MAA, since 2001)

American Mathematical Society (AMS, since 2001)

American Economics Association (AEA, since 2005)