

# Amber M. Smith

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## CONTACT INFORMATION

Theoretical Biology and Biophysics  
Los Alamos National Laboratory  
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## RESEARCH INTERESTS

Developing and analyzing dynamical systems for infectious diseases. Specifically modeling *Influenza* viral dynamics, *Streptococcus pneumoniae* bacterial dynamics, viral/bacterial synergism, and treatment strategies using mathematical and statistical methods.

## EDUCATION

**University of Utah**, Salt Lake City, UT USA

**Ph.D.** Applied Mathematics, 2009

Thesis: *Mathematical Models of Influenza A Virus and Streptococcus pneumoniae Infections*  
Chair: Frederick R. Adler

**M.S.** Applied Mathematics, 2005

**Colorado School of Mines**, Golden, CO USA

**B.Sc.** Mathematical and Computer Sciences, 2003

Option: Modeling, Analysis and Computation

Area of Special Interest: Economics and Business

Minor: Public Affairs for Engineers

Graduated with High Scholastic Honors

**Park City Mathematics Institute Graduate Summer School**, Park City, UT USA

June - July, 2005, Topic: Mathematical Biology

**Institute for Advanced Study Program for Women in Mathematics**, Princeton, NJ USA

May 2003, Topic: Mathematical Biology

## HONORS, AWARDS AND SCHOLARSHIPS

National Science Foundation (NSF) Research Training Group (RTG) grant, 2006-2009

NSF Integrative Graduate Education and Research Traineeship (IGERT), 2003-2005

Professor Everett Mathematics Award, Outstanding Graduating Senior, 2003

Edays Engineer, Outstanding Senior in Mathematical and Computer Sciences, 2003

NSF Computer Science, Engineering, and Mathematics Scholarship (CSEMS), 2002-2003

Peer Mentor of the Year Award, 2002

Colorado School of Mines Research Experience for Undergraduates (REU) Recipient, 2002

Leo Borasio Outstanding Junior Award, McBride Honors Program 2002

Colorado School of Mines Alumni Association Scholarship, 2001

McBride Honors Program Scholarship, 2000-2003

Rosalyn Temple Endowed Scholarship, 2000-2001

Colorado School of Mines Presidential Scholarship, 1999-2003

## ACADEMIC AND PROFESSIONAL EXPERIENCE

**Los Alamos National Laboratory** Los Alamos, NM USA

**Theoretical Biology and Biophysics (T-6)**, *Postdoctoral Research Associate* **2009-present**

Developing mathematical models of *Influenza* kinetics, *Streptococcus pneumoniae* kinetics, mechanisms of viral/bacterial synergism.

Advisors: Alan S. Perelson

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**University of Utah** Salt Lake City, UT USA  
**Division of Clinical Epidemiology**, *Research Fellow* **2009**  
Modeling infectious diseases and assessing risk of biodefense research at the National Emerging Infectious Disease Laboratories (NEIDL).  
Advisors: Adi Gundlapalli

**Los Alamos National Laboratory** Los Alamos, NM USA  
**Center for Nonlinear Studies (CNLS)/Theoretical Biology and Biophysics (T-6)**  
*Research Assistant* **Summer 2008**  
**Summer 2007**  
**Summer 2006**

Mathematically modeled lethal synergism between *Influenza* and *Streptococcus pneumoniae*.  
Advisors: Alan Perelson and Ruy Ribeiro

**University of Utah** Salt Lake City, UT USA  
**Division of Pediatrics and Infectious Diseases, Division of Clinical Epidemiology**  
*Research Assistant* **Summer 2004**  
Explored mathematical models to describe serotype replacement, antibiotic resistance, and carriage prevalence in *Streptococcus pneumoniae*.  
Advisors: Andrew Pavia, Carrie Byington, Matthew Samore, and Fred Adler

## LABORATORY EXPERIENCE

**St. Jude Children's Research Hospital** Memphis, TN USA  
**Department of Infectious Diseases**, *Laboratory Research Assistant* **2007**  
*In vivo* characterization of BALB/c mouse lung viral titers, bacterial titers and secondary pneumonia for infection with *Influenza A* virus strain 1918 PB1-F2/PR8 and *Streptococcus pneumoniae*.  
Advisors: Jon McCullers and Julie McAuley

## PUBLICATIONS

Smith, A.M. and Ribeiro, R.M. (2009). Modeling the Viral Dynamics of Influenza A Virus Infection. *Crit. Rev. Immunol.* (accepted).

Smith, A.M., Adler, F.R. and Perelson, A.S. (2009). An Accurate Two-Phase Approximate Solution to an Acute Viral Infection Model. *J. Math. Biol.* (in press).

McAuley, J.L., Hornung, F., Boyd, K.L., Smith, A.M., McKeon, R., Bennink, J., Yewdell, J.W. and McCullers, J.A. (2007). Expression of the 1918 Influenza A Virus PB1-F2 Enhances the Pathogenesis of Viral and Secondary Bacterial Pneumonia. *Cell Host & Microbe*, 2:240-249.

## TEACHING EXPERIENCE

**University of Utah** Salt Lake City, UT USA  
**Department of Mathematics**, *RTG Fellow*  
Biol 5910: Mathematical Models in Biology **2008 - 2009**  
REU: Circadian Rhythms **2007 - 2008**  
Math 5120: Mathematical Biology II **2006 - 2007**  
Math 5110/6830: Mathematical Biology I

**University of Utah** Salt Lake City, UT USA  
**Department of Mathematics**, *Instructor* **2005 - 2006**  
Math 1100: Quantitative Analysis  
Math 1090: College Algebra for Business and Social Sciences

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**Park City Mathematics Institute (Institute for Advanced Study)** Park City, Utah USA  
**Undergraduate Summer School (Mathematical Biology),** *Teaching Assistant*  
Course: Dynamics, Disease and Diversity, Lecturer: Fred Adler **Summer 2005**

**Colorado School of Mines** Golden, CO USA  
**Student Development and Academic Services,** *Academic Excellence Workshop Facilitator*  
Course: Differential Equations **Spring 2003**

**Colorado School of Mines** Golden, CO USA  
**Student Development and Academic Services,** *CSM101 Peer Mentor* **2002 - 2003**  
Academic advisor to first year CSM students.

**Colorado School of Mines** Golden, CO USA  
**Student Development and Academic Services,** *Tutor* **2001 - 2003**  
Subjects: Calculus I, II, III, Differential Equations, Probability and Statistics, C++, Data Structures, Software Engineering, Linear Algebra, and Algebraic Structures.

### CONFERENCES ATTENDED

**2nd Co-Infection Meeting,** St. Jude Children's Research Hospital, May 2009

**Center for Quantitative Biology Workshop,** Dept of Mathematics and College of Science, University of Utah, April 2009

**NIH National Graduate Student Research Festival,** NIH Main Campus, September 2008

**Society for Mathematical Biology (SMB) Annual Conference,** Center for Mathematical Medicine & Fields Institute, University of Toronto, July-August 2008

**Mathematical Perspective on Cancer Immunology Workshop,** Dept of Mathematics, University of Utah, May 2008

**4<sup>th</sup> Orthomyxovirus Research Conference,** Marine Biological Laboratory, September 2007

**qBio Conference on Cellular Information Processing,** CNLS, August 2007, August 2008

**Complexity of Biological and Soft Materials,** CNLS Annual Conference, May 2007

**Socio-Technical Systems: Bridging the Scales,** CNLS Annual Conference, August 2006

**Utah Mathematical Biology IGERT Student Workshop,** University of Utah  
Topic: Biological Polymers and Cell Motility, May 2006 (Organizer)  
Topic: Neurobiology, Folate and Methionine Metabolism, and Public Health, June 2005

**Modeling the Dynamics of Human Diseases: Emerging Paradigms and Challenges,** AMS-IMS-SIAM Research Conference, July 2005

**3<sup>rd</sup> Annual Ecology and Evolution of Infectious Diseases Conference,** Colorado State University, May 2005

**Workshop on Modeling the Rapid Evolution of Infectious Diseases: Epidemiology and Treatment Strategies,** The Fields Institute and University of Western Ontario, May 2005

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**Utah-Arizona IGERT Biomathematics Summit,**  
University of Utah - May 2005, University of Arizona - May 2004

**Mathematical Biology Summit,** University of Utah,  
September 2005, September 2004, August 2003

INVITED PRESENTATIONS *Mathematical Modeling of Secondary Bacterial Infections Following Influenza*  
2nd Co-Infection Meeting, St. Jude Children's Research Hospital, May 2009

PRESENTATIONS *Life or Death: Immune Activation and Response to a Streptococcus pneumoniae Infection*  
SMB Annual Conference, University of Toronto, August 2008

*Lethal Synergism Between Influenza and S. pneumoniae: The Control Models*  
CNLS Student Seminar, Los Alamos National Laboratory, July 2008

*Who Needs a Watch?! The Science of Biological Clocks*  
Undergraduate Colloquium, Dept of Mathematics, University of Utah, November 2007

*Mathematical & Experimental Work on the Lethal Synergism Between Influenza and S. pneumoniae*  
Mathematical Biology Seminar, Dept of Mathematics, University of Utah, August 2007

*Within-Host Dynamics of Secondary Infections: Influenza and Streptococcus pneumoniae*  
CNLS Student Seminar, Los Alamos National Laboratory, July 2007

*In vivo Kinetics of Influenza Virus 1918 PB1-F2/PR8 & Secondary Bacterial Pneumonia*  
Influenza Group, Dept of Infectious Diseases, St. Jude Children's Research Hospital, January 2007

*Models for Viral-Bacterial Synergism: Influenza and Streptococcus pneumoniae*  
Mathematical Biology Seminar, Dept of Mathematics, University of Utah, September 2006

*Models for Viral-Bacterial Synergism: Influenza and Streptococcus pneumoniae*  
CNLS Student Seminar, Los Alamos National Laboratory, August 2006

*Synergistic Interactions of Influenza and Streptococcus pneumoniae*  
CNLS Student Seminar, Los Alamos National Laboratory, June 2006

*Modeling the 2000/01 Cholera Epidemic in South Africa*  
Park City Mathematics Institute Graduate Summer School, July 2005

*Population Invasions: Models,  $R_0$ , and NGO's for Infectious Diseases*  
Graduate Colloquium, Dept of Mathematics, University of Utah, November 2004

*Streptococcus pneumoniae: Vaccines, Serogroup Replacement, Carriage and Antibiotic Resistance*  
Mathematical Biology Summit, University of Utah, September 2004

POSTERS *Expression of 1918 Influenza A Virus PB1-F2 Enhances Viral Production and Cell Death*  
NIH Graduate Student Research Festival, NIH Main Campus, September 2008

*Modeling Lethal Synergism Between Influenza and Streptococcus pneumoniae*  
4<sup>th</sup> Orthomyxovirus Research Conference, Marine Biological Laboratory, September 2007

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*Modeling Lethal Synergism Between Influenza and Streptococcus pneumoniae*  
Student Research Symposium, Los Alamos National Laboratory, August 2007

COMPUTER SKILLS Mathematical Programming and Packages: Matlab, Maple, Mathematica  
Statistical Programming and Packages: S-Plus, R  
Applications: L<sup>A</sup>T<sub>E</sub>X  
Operating Systems: Unix/Linux, Macintosh, Windows

PROFESSIONAL MEMBERSHIPS American Mathematical Society (AMS)  
Association for Women in Mathematics (AWM)  
Society for Industrial and Applied Mathematics (SIAM)  
Society for Mathematical Biology (SMB)

OTHER ACTIVITIES University of Utah  
College of Science Student Member at Large and College Council Member (2007-2008)  
Graduate Student Advisory Committee (GSAC) - Co-chair (2007-2008)  
GSAC - Recruitment Committee Head (2004-2005)  
Women in Science, Mathematics and Engineering Group