Melanie E. Moses

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EDUCATION

1989-1993 Stanford University, B.S. Symbolic Systems
2000-2005 University of New Mexico, Ph.D Biology with distinction, advisor Bruce Milne
2005-2006 University of New Mexico, Postdoctoral research, Department of Biology advisor James H. Brown, and Computer Science advisor Stephanie Forrest.

PROFESSIONAL ACADEMIC POSITIONS

2013 to present Associate Professor, Computer Science, University of New Mexico
2012 to present External Faculty, Santa Fe Institute
2007 to 2013 Assistant Professor, Computer Science, University of New Mexico
2010 to present Secondary Appointment, Biology, University of New Mexico

SELECTED AWARDS

2013 UNM School of Engineering Junior Teaching Excellence Award
2012 UNM School of Engineering Junior Research Excellence Award
2011 UNM Outstanding New Teacher of the Year
2010 UNM Faculty of Color Research Award
2008 New Mexico Academy of Sciences Distinguished Lecturer
2008 Microsoft New Faculty Fellowship Finalist
2004 - 2005 Ford Foundation Dissertation Diversity Fellow
2002 - 2005 New Mexico Alliance for Graduate Education and the Professoriate Fellow
2000 - 2003 EPA Science to Achieve Results (STAR) Fellow
1989 -1993 Undergraduate Training Program Scholar, Department of Defense
1989 National Merit Finalist, National Achievement Scholar

PUBLICATIONS * indicates student advisees

Journal Publications

*Flanagan TP, Pinter-Wollman NM, Moses ME, Gordon DM. Fast and flexible: Argentine ants recruit from nearby trails. *PloS one* 8(8):e70888. 2013.

Cannon JL, *Asperti-Boursin F, *Letendre KA, Brown IK, Korzekwa KE, Blaine KM, Oruganti SR, Sperling AI, and Moses ME. PKCθ Regulates T Cell Motility via Ezrin-Radixin-Moesin Localization to the Uropod. *PloS one* 8(11):e78940. 2013.

Steinkamp MP, *Winner KK, Davies S, Muller C, Zhang Y, Hoffman RM, Shirinifard A, Moses ME, Jiang Y, and Wilson BS. Ovarian tumor attachment, invasion, and vascularization reflect unique microenvironments in the peritoneum: insights from xenograft and mathematical models. *Frontiers in oncology 3*. 2013.

*Holtschulte N, Moses M. Diversity and Resistance in a Model Network with Adaptive Software. *Security Informatics* 1(1):1-11. 2012.

*Zuo W, Moses ME, West GB, Hou C, Brown JH. A general model for effects of temperature on ectotherm ontogenetic growth and development. *Proceedings of the Royal Society B: Biological Sciences* 279(1734):1840–1846. 2012.

*Flanagan TP, *Letendre K, Burnside WR, *Fricke GM, Moses ME. Quantifying the effect of colony size and food distribution on harvester ant foraging. *PloS one* 7(7):e39427. 2012.

*Burnside, W.R., J. H. Brown O. Burger, M. J. Hamilton, M. E. Moses, & L. M.A. Bettencourt. "Human macroecology: linking pattern and process in big-picture human ecology." *Biological Reviews* 87(1): 194-208. 2012.

Banavar, J.R., M.E. Moses, J.H. Brown, J. Damuth, A. Rinaldo, R.M. Sibly and A. Maritan. "A general basis for quarter power scaling in animals." *Proceedings of the National Academy of Sciences* 107(36): 15816-158120. 2010.

*Banerjee S., & M. E. Moses, "Scale Invariance of Immune System Response Rates and Times: Perspectives on Immune System Architecture and Implications for Artificial Immune Systems" *Swarm Intelligence* 4(4): 301-308. 2012.

deLong, J.P., J.G. Okie, M.E. Moses, R.M. Sibly, and J.H. Brown "Shifts in metabolic scaling, production, and efficiency across major evolutionary transitions of life." *Proceedings of the National Academy of Sciences* 107:12941-12945. 2010.

Moses, M. E. "Engineering: World Wide Ebb" (in Being Human Essay Series). *Nature*.

*Zuo, W., M. E. Moses, C. Hou, W. H. Woodruff, G. B. West, and J. H. Brown. "Response to Comments on Energy Uptake and Allocation During Ontogeny" (in Technical Comments). *Science* 325: 1206-1207. 2009.

Hamilton, M.J., O. Burger, J.P. deLong, R. S. Walker, M. E. Moses, and J.H. Brown. "Population stability, cooperation, and the invasibility of the human species." *Proceedings of the National Academy of Sciences* 106(30):12255-12260.

Moses, M.E., S. Forrest, A.L. Davis, M. Loder and J.H. Brown. "Scaling Theory for Information Networks" *Journal of the Royal Society's Interface* 5(29):1469-1480. doi 10.1098/rsif.2008.0091. 2008. Impact Factor 3.62.

Moses, M.E., C. Hou, W.H. Woodruff, G.B. West, J.C. Nekola, *W. Zuo, and J.H. Brown. "Revisiting a Model of Ontogenetic Growth: Estimating Model Parameters from Theory and Data." *The American Naturalist* 171(5):632-645. 2008.

Hou, C., *W. Zuo, M. E. Moses, J.H. Brown and G. B. West. "Energy Uptake and Allocation During Ontogeny." *Science* 332(5902):736-739. 2008.

Samaniego*, H. and M.E. Moses. "Cities as Organisms: Allometric Scaling of Urban Road Networks in the USA." *Journal of Transport and Land Use* 1:1. 2008.

Charnov, E.L., R. Warne and M.E. Moses. "Lifetime reproductive effort in mammals and lizards." *The American Naturalist* 170: E129-E142. 2007.

Cable, J.M., B.J. Enquist & M.E. Moses. “The Allometry of Host-Pathogen Interactions.” *PLoS ONE* 2(11): e1130. 2007.

Decker, E. D., A. J. Kerkhoff and M. E. Moses. "Global Patterns of City Size Distributions and Their Fundamental Drivers." PLoS ONE 2:e934. 2007.

Savage, V., E. White, M.E. Moses, S. Ernest, B.J. Enquist and E. L. Charnov. “Technical Comment on the Illusion of Life History Invariants.” *Science* 312(5771): 198. 2006.

Moses, M.E. and J.H. Brown. “Allometry of Human Fertility and Energy Use.” *Ecology Letters* 6: 295-300. 2003.

Peer Reviewed Conference and Workshop Proceedings

*Hecker JP, Moses ME. An evolutionary approach for robust adaptation of robot behavior to sensor error. In: *Proceeding of the fifteenth annual conference companion on Genetic and evolutionary computation conference companion* 1437–1444. 2013.

*Letendre K, Moses ME. Synergy in ant foraging strategies: memory and communication alone and in combination. In: *Proceeding of the fifteenth annual conference on Genetic and evolutionary computation conference* 41–48. 2013.

*Hecker J, *Stolleis K, *Swenson B, *Letendre K, Moses M. Evolving Error Tolerance in Biologically-Inspired iAnt Robots. In: *Advances in Artificial Life, ECAL*.Vol 12.; 1025–1032.2013.

*Fricke GM, *Asperti-Boursin F, *Hecker J, Cannon J, Moses M. From Microbiology to Microcontrollers: Robot Search Patterns Inspired by T Cell Movement. In: *Advances in Artificial Life, ECAL* Vol 12 1009–1016. 2013.

*Hecker J, *Stolleis K, *Swenson B, *Letendre K, Moses M. Evolving Error Tolerance in Biologically-Inspired iAnt Robots. In: *Advances in Artificial Life, ECAL* Vol 12 1025–1032. 2013.

*Holtschulte NJ, Moses M. Benchmarking cellular genetic algorithms on the BBOB noiseless testbed. In: *Proceeding of the fifteenth annual conference companion on Genetic and evolutionary computation conference companion*1201–1208. 2013.

Moses ME, *Letendre K, *Hecker JP, *Flanagan TP. In vivo, in silico, in machina: Ants and Robots Balance Memory and Communication to Collectively Exploit Information. In: *Proceedings of the European Conference on Complex Systems 2012* 621–628. 2013.

*Flynn M, Moses M. Improving peer review with ACORN: ACO algorithm for Reviewer’s Network. In: *Swarm Intelligence* 260–267. Springer; 2012.

*Hecker JP, *Letendre K, *Stolleis K, *Washington D, Moses ME. Formica ex machina: ant swarm foraging from physical to virtual and back again. In: *Swarm Intelligence* 252–259. Springer; 2012.

*Banerjee, S., D. *Levin, F. Koster, S. Forrest & M.E. Moses. “The Value of Inflammatory Signals in Adaptive Immune Responses” The 10th International Conference on Artificial Immune Systems (ICARIS). *Lecture Notes in Computer Science* 6825/2011: 1-14. 2011. Cambridge, England. 2011.

Moses, M. E. & S. Banerjee*, "Biologically Inspired Design Principles for Scalable, Robust, Adaptive, Decentralized Search and Automated Response (RADAR)". *Proceedings of the IEEE Conference on Artificial Life:* 30-37. Paris, France. 2011.

T. P. Flanagan*, K. Letendre* , W. Burnside, G. M. Fricke* & M. E. Moses. “How Ants Turn Information into Food.” *Proceedings of the IEEE Artificial Life Conference*:178-185. Paris, France. 2011.

Banerjee*, S. & M. E. Moses."Modular RADAR: An Immune System Inspired Search and Response Strategy for Distributed Systems", *Proceedings of the 9th International Conference on Artificial Immune Systems (ICARIS)*, Edinburgh, Scotland. 2010.

Bezerra, G. S. Forrest, A. L. Davis, M. E. Moses. “Rent’s Rule Traffic Patterns and NoC Topology Scaling” In *Proceedings of the 12th ACM/IEEE international Workshop on System Level interconnect Prediction* in Anaheim, California. SLIP 2010. ACM, New York, NY: 3-8. 2010.

Zarkesh-Ha, P., G.B.P. Bezerra, S. Forrest, and M.E. Moses “Hybrid network on chip (HNoC): local buses with a global mesh architecture." In *Proceedings of the 12th ACM/IEEE International Workshop on System Level interconnect Prediction*: 9-14. 2010.

Banerjee*, S. and M. E. Moses. “A Hybrid Agent Based and Differential Equation Model of Body Size Effects on Pathogen Replication and Immune System Response.” *Proceedings of the 8th International Conference on Artificial Immune Systems* (ICARIS), Lecture Notes in Computer Science 5666: 14-18. 2009.

Arora*, T., and Moses, M.E. “Ant Colony Optimization for Power Efficient Routing in Manhattan and Non-Manhattan VLSI Architectures.” In Proceedings of the 2009 IEEE Swarm Intelligence Symposium, March 2009, Nashville, 137-134. 2009.

Arora*, T. and M. E. Moses. “Using Ant Colony Optimization for Routing in VLSI chips.” In C. Enachescu, B. L. Iantovics and F. G. Filip eds, *Proceedings of Bio-Inspired Computational Methods Used for Solving Difficult Problems*, 145-156. AIP Conference Proceedings 1117. 2008.

Samaniego*, H. and M. E. Moses. “Cities as Organisms: Allometric Scaling of Urban Road Networks.” In *Proceedings of Access to Destinations II*, Minneapolis. 2007. (Extended version published in the Journal of Transport and Land Use).

Peer reviewed Book Chapters

Moses, ME and Forrest S. “Beyond Biology” in *Metabolic Ecology: A Scaling Approach*. Eds. R.M. Sibly, A. Kodric-Brown, and J.H. Brown. Wiley-Blackwell. (pp. 293-301). 2012.

Hayward, A., Gillooly J and Moses ME. “Metabolic Theory of Ecology” in Encyclopedia of Theoretical Ecology, A. Hastings and L. Gross eds., (pp. 426-433). University of California Press, Berkeley. 2012.

Moses, M., *Flanagan, T., *Letendre, K., & *Fricke, M. Ant Colonies as a Model of Human Computation. In *Handbook of Human Computation* (pp. 25-37). Springer New York. 2013.

Book Reviews

Moses ME. Information technology: Slouching towards utopia. *Nature* 502(7471):299–300. 2013.

Moses, ME and S Forrest. "Review of The Computational Beauty of Nature by Gary William Flake." *Artificial Intelligence* 128: 239-242. 2001.

CURRENT FUNDING

NSF Advancing Theory in Biology EF 1038682 “Collaborative Research: Search, Signal and Information Exchange in Distributed Biological Systems.” This research develops agent based models and mathematical theory to understand how immune systems an ant colonies use distributed information processing to effectively search dynamic environments. **Role: PI,** Co- PIs: S. Forrest and D. M. Gordon. 09/2010-8/2014.

DARPA CRASH “Scalable Robust Adaptive Decentralized search with Automated Response (RADAR).” This project mimics processes in immune response to develop scalable, automated and adaptive computer security systems. The project includes building models of adaptive immune response to better understand mechanisms that increase search efficiency and using evolutionary computation to automatically repair computer bugs. **Role: Co-PI,** PI: S. Forrest 10/2010 – 09/2015.

Microsoft Research “Distributed Computation in Ant Pheromone Networks.” New Faculty Fellowship $50K Award. **Role: PI.** 2008 until spent.

NIH R01 AI097202-01A1 “The role of PKCtheta in T cell and T-ALL migration.” The goal of this project is to elucidate the mechanisms involved in controlling T cell migration and migration of T-ALL leukemia cells. **Role: Consultant,** J. Cannon (PI). 05/2012- 04/2017.

NSF STEP “STEPs in the Right Direction: Transforming Engineering/Computer Science Education at the University of New Mexico.” This project provides summer internships and mentoring to 70 Computer Science and Engineering undergraduates at UNM each year. **Role: Co-PI**, PI: T. Aziz. 8/2011-7/2016.

NIH T32EB009414 Program in Interdisciplinary Biological and Biomedical Science (PiBBs). PiBBs unites faculty and trains graduate students from 6 main departments, 2 colleges and 3 institutions (University of New Mexico, Santa Fe Institute and Los Alamos National Laboratory) with research interests in biological theory, modeling and bioinformatics into a comprehensive program leading to a Ph.D. minor in Integrative

Biology. **Role: Senior Personnel**, Program Co-director 2013-present. J. H. Brown (PI) 08/2009-08/2014.

PRIOR FUNDING

National Institutes of Health, Institutional Development Award (IDeA) Program of the National Center for Research Resources P20RR018754 renewal ($10,754,836 total, **$603,482** allocated to Moses subproject). "Predicting Pathogenesis, Immune Response & Epidemic Spread of Multi-host Pathogens, a subproject of the UNM COBRE Center for Evolutionary and Theoretical Immunology (P.I.: E. S. Loker). Subproject Period 08/2009 – 05/2011, total award period 08/2009 – 05/2014.

Prior Funding on NIH P20RR018754 **$310,000** "Modeling viral dynamics and immune response in vertebrates: A subproject of the COBRE Center for Evolutionary and Theoretical Immunology" for award period 7/1/2006 - 06/30/2009.

Sandia National Labs LDRD award for graduate research 09-1292 **($75 K).** "An agent based approach to understanding cooperative foraging in ant colonies." 08/2008 - 07/2011.

SELECTED TALKS

November 2013 "Evolutionary Foundations for Adaptable, Robust and Scalable Robotic Swarms" Invited Seminar to the Bristol Robotics Laboratory. Bristol, England.

November 2013 "Evolving Decentralized and Scalable Technology"
Invited speaker in the Evolution of Technology Seminar. University of Oxford, Saïd Business School. Oxford, England.

October 2013 "Evolutionary Foundations for Adaptable, Robust and Scalable Robotic Swarms" Invited Complex Systems Seminar. Universitat Pompeu Fabra. Barcelona, Spain.

September 2013 "Beyond Pheromones: An integrated ant-inspired approach to swarm robotics." Contributed presentation to the 2013 European Conference on Artificial Life. Taormina, Italy.

August 2013. "Scalable Foraging in Ant Colonies and Robotic Swarms" invited IRIDIA Seminar Universite Libre de Bruxelles.

August 2012 "Beyond pheromones and chemokines: What guides ants to seeds and T cells to influenza?" Invited panel talk, 10th International Conference on Artificial Immune Systems (ICARIS), Sicily, Italy.

August 2012 "A Field Study and Computer Simulation Demonstrate how Colony Size and Food Distribution Affect Ant Foraging Rates" Contributed talk to the European section of the International Union for the Study of Social Insects, Tuscany, Italy.

July 2012 "Beyond Biology: A more general model of network scaling" Invited talk, Gordon Research Conference on the Metabolic Basis of Ecology, College of New England, Maine.

November 2011 “Metabolic human ecology: A network perspective on the design of social systems.” Invited talk, American Institute of Architects, Albuquerque.

November 2011 “How do ants turn information into food? Insights from field studies and computer models.” Invited talk, University of Oklahoma Zoology Seminar.

October 2011 “Network Scaling: How size determines the growth and behavior of organisms and societies.” Invited talk to the Complex Systems Lecture Series, University of Alaska Anchorage.

April 2011 “Biologically Inspired Design Principles for Scalable, Robust, Adaptive, Decentralized Search and Automated Response (RADAR)". Contributed talk at the IEEE Artificial Life Conference. Paris, France.

March 2011 “How Ants Turn Information Into Food, A Case Study in Scalable Distributed Search” Invited seminar to the Santa Fe Institute.

August 2010 “The role of animal size in life history, immunology and epidemiology” International Network in Theoretical Immunology Meeting, Los Alamos National Lab.

March 2010 “Predicting West Nile Virus Spread: from intracellular replication to epidemics in avian communities” UNM Center for Evolutionary and Theoretical Immunology Seminar.

August 2009 “Scaling of infrastructure and resource distribution networks in the urban environment” invited talk to the Human Macro Ecology Symposium at the Ecological Society of America Annual Conference.

May 2009 “Biological computation: Scaling up from ant colonies & immune systems to human societies” invited presentation to the Department of Homeland Security 1st workshop on Biologically Inspired Approaches to Modeling Social Dynamics, Washington DC.

April 2008 “Scaling in Natural and Engineered Networks” Microsoft New Faculty Fellowship Conference, Seattle.

Sept. 2008 “Networks: how exchanges of energy and information shape organisms and societies” University of Wyoming Department of Biology Seminar.

Nov. 2008 “Networks: how exchanges of energy and information shape the evolution of organisms and societies” New Mexico Academy of Sciences 2008 Distinguished Lecturer.

July 2007 “Scaling of Distribution Networks in Organisms, Societies and Information Systems” invited talk at the Scaling in Biological and Social Networks Workshop at the Santa Fe Institute, NM.

Feb. 2007 “Metabolic Scaling in Social and Information Networks” presentation in the AAAS Annual Meeting, Symposium on Universal Laws Governing Biological Systems, San Francisco, CA.

Dec. 2006 “Conceptual Foundations of the Metabolic Theory of Ecology” invited presentation to the National Research Council’s Conceptual Basis of Biology Workshop, Washington D.C.

Oct. 2006 “A tale of two societies: network scaling in human and ants” invited seminar to the Ecology and Evolutionary Biology Department at the University of Arizona.

June 2006 “Scaling in Social Networks” invited presentation to the Santa Fe Institute Business Network Meeting, Seattle, WA.

Sept. 2005 “Metabolic Scaling from Individuals to Societies” presented at the Conference of Ford Fellows, National Academy of Sciences, Washington D.C.

Jan. 2005 “The effect of colony size on energy acquisition rates in Pogonomyrmex” oral presentation at the Sevilleta LTER Annual Symposium, New Mexico.

July 2004 “The Allometry of Human Energy Consumption and Reproduction: Implications for Sustainability” invited presentation at the Gordon Conference on the Metabolic Theory of Ecology, Bates College, Maine.

April 2003 “Human Energy Consumption and Reproduction: The Geometry of Resource Networks” oral presentation at the US-International Association of Landscape Ecologists, Banff, Canada.

April 2003 “Human Energy Consumption and Reproduction” oral presentation at the UCLA Human Complex Systems Conference, Lake Arrowhead, CA.

TEACHING

Introduction to Scientific Modeling (CS 365) Fall 2010, 2012

Topics in Interdisciplinary Biology and Biomedical Science Fall 2013

Discrete Mathematics (CS 261) Spring 2011

Computer Programming for Biologists (CS 390/590, new course developed)
Fall 2007, 2008, 2009, 2011

Complex Adaptive Systems (CS 593) Spring 2008, 2009, 2010, 2012, 2013

Biological Computation Graduate Seminar (CS 691) every semester 2007-present

Distributed Communication in Ant Colonies and Immune systems 4 week module in the UNM SIBBS graduate seminar Fall 2009

Teaching Assistant for the Introductory Biology Lab, Fall 2003

Biology GRE prep course for Minority Access to Research Careers (MARC), 2003-2005
Teaching Assistant for Biology department course in Ethnobotany, Summer 2002

STUDENT ADVISEES

Current

Matthew Fricke, CS Ph.D. student, January 2013-present
Neal Holtschulte, CS Ph.D. student, January 2011-present

Tatiana Paz, CS Masters student & Biology Ph.D student, May 2009 – present
Joshua Hecker, CS Ph.D. student, August 2008 – present
Kim Kanigel, Biology Ph.D. student, January 2008 – present

Karl Stoleis, CS Masters student, January 2011 – present
Justin Carlmichael, undergraduate May 2013 - present
Daniel Washington, high school intern, May 2011 – present

Francois Asperti Broursin, postdoc CS and UNM School of Medicine, 1/ 2012 – present

Graduated and Former Students and Post Docs

Soumya Banerjee, CS Ph.D. student, graduated Spring 2013
Chris Miles, CS Masters student, Spring 2013
Mark Flynn, CS Masters student, May 2011
Kenneth Letendre, CS Masters student December 2010
(committee member for his Biology PhD spring 2011)
Tamanna Arora, CS Masters student, Fall 2009

Adetomiwa Oguntuga, Undergraduate CS REU student, 2010, 2011
Sam Hopkins, Undergraduate CS student researcher, 2008 – 2010
Bjorn Swenson, undergraduate CS student researcher, 2011 – 2012
Sheldon Jordon, postdoc CS and Biology, 2012 – 2013
Dr. Horacio Samaniego, postdoc 2007 – 2008, now Assistant Prof, U. Austral de Chile

Thesis and Dissertation Committees served on

Graduated
Frederick Crawford, MS, 2007, Computer Science
Tiffany Pierce, MS, 2008, Computer Science
Martha Perez, MS, 2009, Computer Science
Sushmita Roy, Ph.D., 2009, Computer Science
Kshanti Green, Ph.D. 2010, Computer Science
Stacy Scholle, MS 2010, Biology
Katie Sears, Undergraduate Honors 2010, Biology at Kenyon College Jordan Oakie, 2011 Biology Ph. D. and PiBBS Fellow
Wenyun Zuo, 2011 Biology Ph. D. PiBBS Fellow
Kenneth Letendre, 2011 Biology Ph. D.
Ricardo Villalon, Ph.D. 2012, Computer Science
William Burnside, Ph.D. 2012, Biology
George Bezerra, Ph.D. 2012, Computer Science
Oleg Semenov, Ph.D. 2013, Computer Science
Nicola Bezzo, Ph.D. 2013, Computer Engineering

Current
Sarah Joyce, PhD candidate, Anthropology
Drew Levin, PhD candidate, Computer Science
Robbie Burger, PhD candidate, Biology
Christian Gunning, PhD candidate, Biology
Aleksandra Faust, PhD candidate, Computer Science

OUTREACH

Outreach to Project GUTS (Growing Up Thinking Scientifically) and GUTS-y-Girls at the Santa Fe Institute, which trains New Mexico middle school teachers and students in computational science, agent based modeling and complex systems. This long-term partnership has included leading GUTS trainings and workshops, involving pre-college students in field studies, computer modeling of ant colonies, and presentation of their results to their peers; mentoring students to develop science fair projects and projects for the New Mexico Supercomputing Challenge; developing a day long workshop to introduce middle school girls to computer modeling and scientific careers. (2008-present)

Dozens of **presentations, seminars and workshops to promote interdisciplinary education** including to Project GUTS, a Science Café at the NM Museum of Natural History, the PIBBS program, CETI program, MIND Institute, Artificial Selection Panel at 516 Arts Performance Space, Biological Discovery and Innovation Seminar, Central New Mexico Community College (CNM), the Consortium of the Americas, local high schools, the New Mexico Super Computing Challenge, the Science Education Institute of the Southwest summer program for K-12 teachers, and the New Mexico Celebration of Women in Computing.

Advisory Board Member, UNM Pre-college Math and Science Program which encourages and prepares primarily African American pre-college students to enter STEM fields.

Frequent Panelist to promote diversity in education including for the Project for New Mexico Graduates of Color, Black Graduate and Professional Student Association, Strategies for Ecology Education Diversity and Sustainability (SEEDS) Program, and UNM Society for Women Engineers. Faculty Advisor for the UNM gay graduate student group.

University SERVICE

Co-Director UNM Program in Interdisciplinary Biology and Biomedical Sciences (**PiBBS**) (2013-present; **Advisory Board Member** 2010-present). Contributions include selecting fellows, arranging seminars, advising students, and advising on scientific and educational structure and focus of the program.

Education Liaison, UNM School of Medicine Spatiotemporal Modeling Center (STMC). Interdisciplinary advisement of students, assist in designing courses and negotiating requirements for interdisciplinary research and education, foster collaboration between the STMC and students and faculty in the School of Engineering and School of Arts and Sciences. (2009-2011)

Department of Computer Science Faculty Advisor for the NSF sponsored Program **STEPs in the Right Direction: Transforming Engineering/Computer Science**

Education at the University of New Mexico. Arrange summer internships and scientific conference participation for approximately 30 undergraduate computer science students; arrange mentoring for all undergraduate students in faculty led "University Families." (2011 - present)

Chair, CS Department Chair Search Committee (2013)
Member, CS Department Chair Search Committee (2011,2012)
Member, Biology Research Professor Search Committee (2012)
Member, School of Engineering Associate Dean for Research Search Committee(2010)
Member, Faculty Search Committee (2007)
Member, Lecturer Search Committee (2006/7)

Reviewer, UNM Teacher of the Year Award Committee

Reviewer, UNM CETI seed grants (2009, 2011)

Faculty Advisor to the Computer Science Graduate Student Association (2010-12)
Lead Annual Review of Graduate Student Progress (2011-13)
Lead workshop to advise Graduate Student Fellowship Applications (2010)
Incoming Graduate Student Advising Committee (2008-2009)
Co-organized annual graduate student recruiting event and Graduate Student Orientation (2008-2009)
Master's Curriculum Re-design Committee (2007)

External service

Program committee for Artificial Immune Systems (ICARIS) workshop at the Genetic and Evolutionary Computation Conference (GECCO) 2014 and Artificial Life 2014

Vice Chair of the Gordon Research Conference on the Metabolic Basis of Ecology (2010-2012)

Co-Vice Chair Gordon Research Conference on the Metabolic Basis of Ecology (2008-2010)

NSF review panels Spring 2011, Fall 2011, Spring 2009

Reviewer for: *Nature, Proceedings of the National Academy of Science, Ecology Letters, The Royal Society Interface, Physica A, Journal of Theoretical Biology, Bulletin of Mathematical Biology, The American Naturalist, Proceedings of the Royal Society B, Oecologia, Functional Ecology, Networks and Spatial Economics, PLoS ONE, IEEE International Conference on Robotics and Automation (ICRA), and IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*

Participant in NSF workshop to redesign the Computing curriculum, held at the Santa Fe Institute January 2011.

Co-organizer of the International Network in Theoretical Immunology Meeting, Los Alamos National Lab, August 2010.

Board member for the Social Logical Institute (2010-present)

Presentation to the National Research Council Committee on Defining and Advancing the Conceptual Basis of Biological Sciences in the 21st Century, Conceptual Basis of Biology Workshop (2006)

OTHER EMPLOYMENT and Volunteer Work

1999 *Research Intern at the Smithsonian Environmental Research Center.*

1997 to 1999 Network Security Manager and Technology Risk Specialist, Fannie Mae: Manage the computer network security team, conduct vulnerability analysis for electronic commerce, and conduct penetration tests to assess corporate computer network security.

1993-1997 Computer Scientist, Information Security Group, Department of Defense: design, install, and evaluate hardware and software systems for secure government computer communications including encryption and public key management, network security and intrusion detection. Drafted research initiatives to address computer network vulnerabilities for the first National Information Infrastructure Risk Assessment.

Active member of Young Women United, a grass roots group working to educate, empower and reduce violence against, young women of color in Albuquerque. (2001-2004)

Volunteer with Habitat for Humanity, Fannie Mae Help the Homeless Campaign, Whitman Walker crisis counseling, Washington D.C.; Water for People, I'jatz Permaculture Farm, Guatemalan highlands; International Brigade home builder, Esteli, Nicaragua. (1996-2001)