Shelby Wilson, Ph.D.

Contact Information	Department of Biology University of Maryland 4094 Campus Drive College Park, MD 20742	*Phone:* +1 (301) 405 - 6890 *E-mail:* snwilson@umd.edu *Web:* www.shelby-wilson.com

Summary I am an Applied Mathematician with scientific experience broadly described as being in the area of computational biology. I use the techniques of parameter estimation, dynamical systems, network theory, and machine learning to create models of biological phenomenon (e.g. cancer growth, sleep dynamics, social organization). My current research interests and expertise facilitate truly interdisciplinary collaborations spanning a number of subject areas including mathematics, computer science, physics, and biology.

Skills and Expertise Computational Biology, Data Science, Statistical Parameter Estimation, Machine Learning, Complex Systems, Mathematical Oncology, Evolutionary Biology

Computational Skills Matlab, Python, C++, R, Shell Script, Parallel Computing, LaTeX, MLXTran

Languages English (Native), French (Intermediate)

Professional Experience

Assistant Professor of Biology — Aug 2019 - Present
University of Maryland, College Park, MD, USA

Associate Professor of Mathematics — Jan 2019 - Present
Morehouse College, Atlanta, GA, USA

Assistant Professor of Mathematics — Jan 2014 - Jul 2019
Morehouse College, Atlanta, GA, USA

Postdoctoral Research Associate — Jun 2012 - Dec 2013
INRIA Grenoble - Rhône-Alpes, Montbonnot, France
The Stochastic Approximation of Expectation Maximization Yields Individualized Predictions for Optimal Combined Cancer Treatment
Supervisor: Benjamin Ribba, Ph.D

NASA Dryden Flight Research Center, Edwards, CA — Jun 2004 - Jul 2004
Intern. Worked in mission management and planning for NASAs DC-8 aircraft on the Intercontinental Chemical Transport Experiment- North America.

NASA Marshall Space Flight Center, Huntsville, AL — May 2003 - Jul 2003
Intern. Created web database interfaces that aided in the management NASAs Integrated Financial Management Program.

Education

Ph. D., Applied Mathematics — May 2012
University of Maryland, College Park, MD, USA
Mathematical Models of Immune Regulation and Cancer Vaccines
Advisor: Prof. Doron Levy

B. S., Mathematics, Summa Cum Laude — May 2006
B. S., Computer Science, Summa Cum Laude — May 2006
Spelman College, Atlanta, GA, USA
The NTRU Public Key Cryptosystem
Advisor: Prof. Jeffrey Ehme

PEER REVIEWED PUBLICATIONS

S. Wilson, S. Sindi, H. Brooks, M. Hohn, C. Price, A. Radunskaya, N. Williams, and N. Fefferman. *How Emergent Social Patterns in Allogrooming Combat Parasitic Infections.* To appear in *Frontiers in Ecology and Evolution.*

S. Banuelos, J. Best, G. Huguet, A. Prieto-Langarica, P. Pyzza, **Shelby Wilson**. *Modeling the Long Term Effects of Thermoregulation on Human Sleep.* To appear in *Journal of Theoretical Biology.*

C. Flores, A. Prieto Langarica, and **S. Wilson**. *Working with students from underrepresented minority groups.* In Michael Dorff, Allison Henrich, and Lara Pudwell, editors, *A Mathematicians Practical Guide to Mentoring Undergraduate Research.* AMS—MAA Press (2019).

H. Brooks, M. Hohn, C. Price, A. Radunskaya, S. Sindi, N. Williams, **S. Wilson**, N. Fefferman. *Mathematical analysis of the impact of social structure on ectoparasite load in allogrooming populations.* Understanding Complex Biological Systems with Mathematics (2018). doi: 10.1007/978-3-319-98083-6.

N. Williams, M. Hohn, C. Price, A. Radunskaya, S. Sindi, **S. Wilson**, H. Brooks, N. Fefferman. *How Disease Risks Can Impact the Evolution of Social Behaviors and Emergent Population Organization.* Understanding Complex Biological Systems with Mathematics (2018). doi: 10.1007/978-3-319-98083-6.

T. Johnson, **S. Wilson**. *Modeling Evolutionary Dynamics of Human Immunodeficiency Virus.* Proceedings of the Harriett J. Walton Symposium on Undergraduate Mathematics Research. Volume 14 (2016).

S. Wilson, M. Tod, A. Ouerdani, A. Emde, Y. Yarden, A. Adda Berkane , S. Kassour, M. Wei, G. Freyer, B. You, E. Grenier, B. Ribba. *Modeling and predicting optimal combination scheduling between antiangiogenic drug and chemotherapy in preclinical settings.* CPT : Pharmacometrics & Systems Pharmacology (2016). doi: 10.1002/psp4.12045.

J. Best, P. Fuller, S. Garcia-Torres, G. Huguet, A. Prieto-Langarcia, and **S. Wilson**. *Effects of thermoregulation on human sleep patterns: A mathematical model of sleep/wake cycles with REM/NREM sub-circuiut.* Applications of Dynamical Systems in Biology and Medicine (2015). doi: 10.1007/978-1-4939-2782-1_6.

S. Wilson and D. Levy. *Functional switching and stability of the regulatory T cell population.* Bulletin of Mathematical Biology (2013). doi: 10.1007/s11538-013-9875-9.

F. Lignet, S. Benzekry, **S. Wilson**, F. Billy, O. Saut, M. Tod, B. You, A. Adda Berkane, S. Kassour, M. X. Wei, E Grenier, and B. Ribba. *Theoretical investigation of the efficacy of antiangiogenic drugs combined to chemotherapy in xenografted mice.* Journal of Theoretical Biology (2012). doi: 10.1016/j.jtbi.2012.12.013.

S. Wilson and D. Levy. *A Mathematical Model of the Enhancement of Tumor Vaccine Efficacy by Immunotherapy.* Bulletin of Mathematical Biology (2012). doi:10.1007/s11538-012-9722-4.

S. N. Wilson, P. Lee, and D. Levy. *A Mathematical Model of the Primary T Cell Response with Contraction Governed by Adaptive Regulatory T Cells.* IFMBE Proceedings, College Park, MD, 32: 209-212 (2010).

Popular Scientific Activities

Podcast Appearance. Relatively Prime: Stories from the Mathematical Domain (2019).

E. Graham, R. Higgins, C. Price, and **S. Wilson**. *AMS Poster : Historical Black Mathematicians*. Available at `http://www.ams.org/publicoutreach/posters` (2018).

E. Graham, R. Higgins, C. Price, and **S. Wilson**. *AMS Poster : Mathematically Gifted and Black*. Available at `http://www.ams.org/publicoutreach/posters` (2018).

E. Graham, R. Higgins, C. Price, and **S. Wilson**. *The Mathematically Gifted and Black Website.* Notices of the AMS Volume 65, Number 2 (2018).

R. Higgins, E. Graham,and **S. Wilson**. *SIAM Celebrates Diversity in Mathematics.* SIAM News. Volume 49, Number 10 (2016).

Invited Talks (Selected)

Seminar. *"A mathematical model of temperature effects on human sleep regulation"*. Bryn Mawr College Mathematics Department Seminar. Bryn Mawr, PA	Nov 2019
Seminar. *"Parasitism, Social Dynamics and Evolution"*. University of Tennessee, Ecology and Evolutionary Biology Seminar. Knoxville, TN	Aug 2019
Etta Falconer Mathematics Lecture. *"Noether, Falconer, Mirzakhani, Kovalesky, & Me"*. Spelman College. Atlanta, GA	Apr 2019
Seminar. *'Statistical Parameter Estimation and Social Network Theory: Toolkits for Studying Individual Versus Group Dynamics"*. University of Maryland Department of Biology Seminar. College Park, MD	Feb 2019
Seminar. *"On the dynamics of coupled Morris-Lecar Neurons*. University of Colorado, Boulder Applied Mathematics Seminar. Boulder, CO	Nov 2018.
The Dorothy Wrinch Lecture in Biomathematics. *"On the dynamics of coupled Morris-Lecar Neurons"*. Women In Mathematics In New England Conference. Northampton, MA	Sep 2018
Invited Lecture. *"An ODE mixed-effect model of vascular tumor growth with anti-angiogenic treatment"*. Iowa State University, Joint EDGE-MOCA Speaker Series. Ames, IA	Apr 2018
Albert Turner Bharucha-Reid Lecture. *"Modeling the Dynamics of the Human Sleep/Wake Cycle"*. NAM Regional Faculty Conference on Research and Teaching Excellence 2017. Atlanta, GA	Mar 2017
Plenary Speaker. *"Effects of Themoregulation on Human Sleep Patterns"*. Georgia Scientific Computing Symposium 2017. Athens, GA	Feb 2017
Seminar. *"Mathematical Model of Temperature effects on Human Sleep Regulation"*. University of Georgia Applied Mathematics Seminar. Athens, GA	Dec 2016
Seminar. *"Optimizing the Combined Treatment of Tumor Growth using Mixed-Effect ODE Modeling"*.	
• Georgia Institute of Technology. Atlanta, GA	Feb 2015
• Moffitt Cancer Center. Tampa, FL	Aug 2014

Seminar. *"Modeling the synergism between anti-angiogenic treatment and chemotherapy In mice"*. F. Hoffmann-La Roche Pharmaceuticals. Basel, Switzerland — Oct 2013

Seminar. *"An ODE Mixed-Effect Model of Vascular Tumor Growth with Anti-Angiogenic Treatment"*. University of Franche-Comté Partial Differential Equations Seminar. Besançon, France — Dec 2012

Invited Lecture. *"Nonlinear Models in Cancer and Immunology"*. Summer School on Nonlinear Dynamics. Peyresq, France. — Aug 2012

Professional Presentations (Abbreviated)

Outreach Related Panel Discussions

- Joint Mathematics Annual Meeting 2020. Denver, CO — Jan 2020
- Joint Mathematics Annual Meeting 2019. Baltimore, MD — Jan 2019
- SIAM Annual Meeting 2018. Portland, OR — Jul 2018
- NSF Workshop, University of Illinois at Chicago. Chicago, IL — Jul 2017
- SIAM Annual Meeting 2017. Pittsburgh, PA — Jul 2017
- SIAM Annual Meeting 2017. Pittsburgh, PA — Jul 2017
- 5^{th} Annual Sonia Kovalevsky Day, University of Wisconsin - Eau Claire — Mar 2017

Related to Modeling Cancer Dynamics and Treatment

- MAA MathFEST 2017. Chicago, IL — Jul 2017
- Joint Mathematics Meetings. Atlanta, GA — Jan 2017
- SIAM Annual Meeting. Boston, MA — Jul 2016
- Micro and Macro Systems in Life Sciences. Bedlewo, Poland — Jun 2015
- Joint Mathematics Meetings. Baltimore, MD. — Jan 2014
- Population Approach Group in Europe Annual Meeting. Glasgow, United Kingdom. — May 2013
- Mathematical Oncology: New Challenges For Systems Biomedicine. Erice, Italy. — Sep 2011
- Cancer Immunology and Immunotherapy: Building on Success. Bethesda, MD — Sep 2011

Related to Modeling Human Sleep Dynamics

- International Council for Industrial and Applied Mathematics. Valencia, Spain — Jul 2019
- Joint Mathematics Meetings. Atlanta, GA — Jan 2017
- SIAM Conference on the Life Sciences. Charlotte, NC. — Aug 2014

Related to Modeling Immune Regulation

- Joint Mathematics Meetings. Baltimore, MD. — Jan 2014
- Summer School on Nonlinear Dynamics. Peyresq, France. — Aug 2013
- 7th International Congress on Industrial and Applied Mathematics. Vancouver, BC. — Jul 2011
- 2010 Southern Biomedical Engineering Conference. College Park, MD. — May 2010

Related to Modeling Neural Synchrony

- IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory. Athens, GA — Apr 2019
- SIAM Annual Meeting. Boston, MA — Jul 2016
- SACNAS National Conference. Washington, DC — Oct 2015

Related to Undergraduate Education and Outreach

- SIAM Annual Meeting. Portland, OR — Jul 2018
- SIAM Applied Mathematics Education Conference. Philadelphia, PA — Oct 2016

Teaching Experience

University of Maryland Aug 2019 - Present
- Courses Taught : Calculus for Life Sciences

Morehouse College Jan 2014-May 2019
- Courses Taught : Basic Statistics, Calculus for Business, Calculus I, Calculus II, Introduction to Ordinary Differential Equations, Numerical Analysis, Precalculus, Senior Seminar

Enhancing Diversity in Graduate Education Program Jun 2014 & Jun 2016
Harvey Mudd College & Purdue University
- Course Instructor : Advanced Calculus / Real Analysis

Enhancing Diversity in Graduate Education Program Jun 2009
Spelman College
- Teaching assistant/mentor in Real Analysis and Algebra

Teaching Assistant, University of Maryland Jun 2007 - May 2012
- Teaching Assistant : Calculus II for Life Sciences, Elementary Mathematical Models, Learning Math Through Games, Numerical Analysis II, Scientific Computing.

Undergraduate Mentoring

(Went on to Graduate School)*
- Ernest Holmes (Aug 2019 - May 2019)
  Separating Data using Multi-layered Neural Networks
- Nicholas Arosamena, Storm Chin, Frederick Jackson, Johnathan Russ (Jan 2019 - May 2019)
  Image Reduction using Singular Value Decomposition
- Franck Nijimbere** (Jan 2018 - May 2018)
  Approximation Theory: A Bitcoin Case Study
  ** Class of 2020 Rhodes Scholar
- Khensu-Ra Love El*, Darian Nwankwo*, Tyree Stevenson, (Jan 2017 - May 2018)
  Determining Near-Optimal Treatment Protocols via ODE Cancer Models
- Lauren Casper, Alexandra Lara, Luc Olivier, Summer 2016
  Modeling Within-Host Dynamics of Schistosomiasis
- Talon Johnson* (December 2014- May 2016)
  A Bio-mathematical Approach to the Stability of HIV and AIDS
- Aquia Richburg* (January - May 2015)
  Modeling the Brain Using Math : Neural Networks and Liquid State Machines
- Tre Wells* : (January - May 2014)
  Agent-Based Models of Transmission of Infectious Disease In Medical Facilities
- Zerotti Woods* (January - May 2014)
  ODE Model Reduction Using Quasi-Steady State Approximation (QSSA)

PROFESSIONAL AND ACADEMIC EXPERIENCE

Referee for Peer Reviewed International Journals
- Bulletin of Mathematical Biology
- Cancer Immunology Immunotherapy
- Fundamental & Clinical Pharmacology
- Involve, A Journal of Mathematics
- Journal of Mathematical Biology
- Journal of Theoretical Biology
- Physics in Medicine and Biology
- PLOS ONE
- Royal Society Open Science

The CodeHouse Co-founder and Member of Board of Directors Jan 2019 - Present
- CODEHOUSE is a non-profit focused on tackling the diversity gap in technology by providing resources to enhance students' technical skills, promoting internship/full-time placement, and elevating the next generation of diverse leaders in technology.

Studying Successful Doctoral Students in Mathematics from Underrepresented Groups Jan 2019 - Present
- External advisory board member for NSF funded project.

American Institute of Mathematics Workshop Co-Organizer Dec 2018 & Dec 2019
- Co-organize the Network of Mathematicians of Color workshop.

Summer Research for Women in Mathematics Program at the Mathematical Sciences Research Institute Jun 2018
- Supported two-week in-residence research stay for myself and four collaborators.

Data Science eXtension (DSX) Workshop Jun 2017 - May 2018
- Two week workshop geared towards faculty development and undergraduate instruction in data understanding

MBI Women Advancing Mathematical Biology Workshop Mar 2017
- Group co-lead on project *Ectoparasites and Allogrooming: Evolutionary Trade-offs in Animal Community Health.*

Future Leaders in interdisciplinary Cancer Research (FLiiCR) Program Summer 2016
- Co-organizer for a summer research experience for undergraduates within the Integrated Mathematical Oncology Lab at Moffitt Cancer Center, Tampa, FL.

University of Maryland MAPS REU Project Co-Leader Summer 2016
- Directed three undergraduate research projects on *Within Host Models of Schistosomiasis.*

Denice Denton Emerging Leaders Workshop Jun 2016
- Workshop focused on the development of knowledge, skills, strategies, and critical networks for mid-career faculty in the fields of engineering, computing, mathematical and physical sciences.

Project NExT (New Experiences in Teaching) Fellow Aug 2015 - Aug 2016

Howard University GEAR UP Project 2012 - 2017
- External Advisory Committee Member for a five year project that sends Howard University students on undergraduate research experiences at universities in a number of developing countries.

Hands-On Research in Complex Systems School Jul 2014 & Aug 2010
ICTP, Trieste, Italy (2014)
University of Buea, Cameroon (2010)
- Assistant. Mathematical modeling session: Introduction to Matlab and dynamical systems.

Funding and Support

Network of Mathematicians of Color Workshop July 2018 & Dec 2019
American Institute of Mathematics

Student Success Through Enhanced Mentoring July 2018
James King, Jr. Institute for Student and Faculty Engagement

MSRI Summer Research for Women in Mathematics Jun 2018
Mathematical Sciences Research Institute

AWM Research Symposium Travel Funding July 2017
Association for Women in Mathematics

SIAM 2016 Minisymposium Travel Funding July 2016
Society of Industrial and Applied Mathematics

HBCU-UP Supplemental Support for UMD MAPS-REU Summer 2016
National Science Foundation

Future Leaders in interdisciplinary Cancer Research Summer 2016
Integrated Mathematical Oncology Lab, Moffitt Cancer Center

SACNAS 2015 Minisymposium Travel Funding Oct 2015
Society for Advancement of Chicanos/Hispanics and Native Americans in Science

Establishing Interdisciplinary Undergraduate Research Interactions in Mathematical Biology Dec 2015
Procter & Gamble Higher Education Grant

MBI Cancer Immune Workshop Travel Funding Spring 2014
Mathematical Biosciences Institute

Honors and Awards

James King, Jr. Institute for Student and Faculty Engagement, Faculty Fellow — Jul 2018 - Jul 2019

Mathematical Biosciences Institute Conference Award — Jan 2014

LSAMP Bridge to the Doctorate Fellowship — Aug 2006 - May 2008
National Science Foundation

NASA Women in Science and Engineering Scholar — Aug 2002 - May 2006
Spelman College

Phi Beta Kappa Society

Professional Service & Committees	Co-founder, Mathematically Gifted and Black (website)	
	Co-founder, Network for Minorities in Mathematical Sciences	
	AWM Humphreys Award Committee Member	Feb 2020 - Present
	SIAM Annual Meeting 2018 Organizing Committee	Jul 2018
	Morehouse College SACS Quality Enhancement Plan Committee	Jan 2017 - Dec 2018
	SIAM Workshop Celebrating Diversity Working Group	Aug 2016 - Dec 2018
	SIAM Diversity Advisory Committee	July 2016 - Dec 2018
	Morehouse College Institutional Review Board	Mar 2016 - May 2019
	Morehouse College Mathematics Colloquium Co-organizer	Aug 2014 - May 2019
	Health Sciences Affiliate, Morehouse College	Aug 2016 - Aug 2017
	National Association of Mathematicians Membership Committee	Aug 2016 - May 2017
Professional Organizations	Association for Women in Mathematics	
	National Association of Mathematicians	
	Society for Industrial and Applied Mathematics	