Blerta Shtylla **Associate Professor**

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Education

Ph.D. in Mathematics, University of Utah, Salt Lake City UT 2011
Dissertation: *Mathematical models of chromosome motility during mitosis*
Adviser: James P. Keener

M.S. in Mathematics, University of Utah, Salt Lake City UT 2007

B.S. in Mathematics, Summa cum laude, Lafayette College, Easton PA 2005

Professional Experience

Associate Professor of Mathematics, Pomona College, Claremont, CA Spring 2019-present

Spring Research Visitor, Mathematical Biosciences Institute, Columbus, OH March 2017

Visiting Assistant Professor, Dept of Mathematics, Harvey Mudd College, Claremont, CA 2016-2017

Visiting Assistant Professor, Dept of Biomathematics, UCLA, Los Angeles, CA Fall 2016

Assistant Professor of Mathematics, Pomona College, Claremont, CA Fall 2013-Fall 2018

Assistant Professor of Mathematics, Mount Holyoke College, South Hadley, MA 2012-2013

Post-Doctoral Fellow, Mathematical Biosciences Institute, Columbus, OH 2011-2012

Fellowships and Grants

The Jayne Koskinas Ted Giovanis Foundation for Health and Policy 2018
Title: "Using quality-of-life scores to guide prostate RT dosing" $61,387
Senior Personnel

Howard Hughes Medical Institute 5C Collaborative Proposal 2017
Pomona College
Title: "An interdisciplinary experimental and mathematical examination of the early maturation events in C. elegans embryos" $13,000
Principal Investigator

National Science Foundation Grant No.1445812 2014-2016
Division of Mathematical Sciences, Conference Awards
Title: "International symposium on biomathematics and ecology: education and research (BEER)" $15,000
Principal Investigator

National Science Foundation Grant No.1358932 2012-2015
Division of Mathematical Sciences, Program in Mathematical Biology
Title: "Mathematical modeling of chromosome organization and segregation in bacteria" $130,000
Principal Investigator

University of Utah Graduate Research Fellowship 2009-2010
University of Utah Graduate School
Recipient Fees, tuition and stipend

Research Interests

Immuno-therapy mechanistic and statistical modeling

Mathematical/Computational Cell Biology

Stochastic Phenomena in Biological Systems

Publications

Books

A. Radunskaya, R. Segal and **B. Shtylla** (Editors). AWMS: Understanding Complex Biological Systems with Mathematics, 2018 *Springer International Publishing.*

Peer-reviewed articles (†undergraduate authors ‡ graduate authors)

1. **B. Shtylla**, M. Gee†, A. Do ‡, S. Shabahang, L. Eldevik, L. de Pillis. A mathematical model for DC vaccine treatment of type I diabetes, 2019, *Frontiers in Physiology*, 10, pp. 1107.
2. J. Gallaher, K. Larripa, U. Ledzewicz, M. Renardy, **B. Shtylla**, N. Tania, D. White, K. Wood, L. Zhu, C. Passey, M. Robbins, N. Bezman, S. Shelat, H. J. Cho, H. Moore. Methods for determining key components in a mathematical model for tumor–immune dynamics in multiple myeloma, 2018, *Journal of Theoretical Biology*, 458, pp. 31-46.
3. J. Gallaher, K. Larripa, U. Ledzewicz, M. Renardy, **B. Shtylla**, N. Tania, D. White, K. Wood, L. Zhu, C. Passey, M. Robbins, N. Bezman, S. Shelat, H. J. Cho, H. Moore. A mathematical model for tumor-immune dynamics in multiple myeloma, 2018, *Springer Association for Women in Mathematics Series, volume 14: Understanding Complex Biological Systems with Mathematics.*
4. D. W. Morgens† and **B. Shtylla**, Stochastic analysis of a mammalian circadian clock model: Small protein number effects, 2017, *Spora: A Journal of Biomathematics*, 3 (1), pp. 86–99.
5. **B. Shtylla** Mathematical modeling of spatiotemporal protein localization patterns in *C. crescentus* bacteria: a mechanism for asymmetric FtsZ ring positioning, 2017, *Journal of Theoretical Biology*, 433, pp.8-20.
6. V. C. Coffman, M. B. A. McDermott†, **B. Shtylla**, A. T. Dawes. Stronger net posterior cortical forces and asymmetric microtubule arrays produce simultaneous centration and rotation of the pronuclear complex in the early Caenorhabditis elegans embryo, 2016,*Molecular Biology of the Cell*, 27(22), pp.3550-3562.
7. L. D. Waldrop, C. D. Behn, E. Braley, J. A. Drew, R. J. Full, L. J. Gross, J. A. Jungck, B. Kohler, J. C. Prairie, **B. Shtylla**, and L. A. Miller. Using active learning to teach concepts and methods in quantitative biology, 2015,*Integrative and Comparative Biology*, 5 (5), pp. 933.
8. C. Xue, **B. Shtylla**, and A. Brown. A Stochastic multiscale model that explains the segregation of axonal microtubules and neurofilaments in neurological diseases, 2015, *PLOS Computational Biology*, 11(8), pp. e1004406.
9. **B. Shtylla** and J. P. Keener. Mathematical modeling of bacterial track-altering motors: Track cleaving through burnt-bridge ratchets, 2015, *Physical Review E*, 91, pp. 042711.
10. J. P. Keener and **B. Shtylla**. A mathematical model of force generation by flexible kinetochore-microtubule attachments*, 2014, *Biophysical Journal* 106(5), pp. 998-1007.
    - *Article featured on the cover of the March 04 issue of the Biophysical Journal, and in : "Modeling Kinetochores: When form and function becomes art" on the Biophysical Society Blog at `http://biophysicalsociety.wordpress.com`
11. A. Sharma*, **B. Shtylla*** and D. Chowdhury. Distribution of lifetimes of kinetochore-microtubule attachments: interplay of energy landscape, molecular motors and microtubule (de-)polymerization, *Physical Biology*, 2014, 11, pp. 036004. *equal contribution.
12. A. Matzavinos, **B. Shtylla**, Z. Voller, S. Liu, and M. A.J. Chaplain. Stochastic modelling of chromosomal segregation: Errors can introduce correction, *Bulletin of Mathematical Biology*, 2014, 76(7), pp. 1590-1606.

13. **B. Shtylla** and J. P. Keener. A mathematical model of ParA filament-mediated chromosome movement in *Caulobacter crescentus.*, *Journal of Theoretical Biology*, 2012, 307, pp. 82-95.
14. **B. Shtylla** and J. P. Keener. A mathematical model for force generation at the kinetochore-microtubule interface, *SIAM Journal on Applied Mathematics*, 2011, 71(5), pp. 1821-1848.
15. **B. Shtylla** and J. P. Keener. A mechanomolecular model for the movement of chromosomes during mitosis driven by a minimal kinetochore bicyclic cascade, *Journal of Theoretical Biology*, 2010, 263(4), pp. 455-70.
16. **B. Shtylla**, L. Traldi, and L. Zulli. On the realization of double occurrence words, *Discrete Mathematics*, 2009, 309(6), pp. 1769-1773.
17. **B. Shtylla** and L. Zulli. An extension of the Jones polynomial of classical knots, *Journal of Knot Theory and Its Ramifications*, 2006, 15, pp. 81-100.

Pre-prints

1. A. Do ‡ and **B. Shtylla** A stochastic whole cell model for protein localization in *Caulobacter Crescentus* bacterium, 2019, *submitted.*
2. D. Olszewski†, C. He†, G. Pintea†, Z. Yang†, R. Chen, T. Chou, **B. Shtylla** A deep learning approach to using Quality-of-Life patient scores in guiding prostate radiation therapy dosing, 2019, *in preparation.*

Honors and Awards

Mathematical Association of America Project NExT Fellow	2012-2014
Phi Beta Kappa, Lafayette College	2005
American Mathematical Society Waldemar J. Trjitzinsky Memorial Award	2004
Mayo Clinic Summer Undergraduate Fellowship Program Mayo Graduate School	Summer 2004
EXCEL Scholar, Mathematics Department, Lafayette College	Summer 2003
Eugene P. Chase Phi Beta Kappa Award, Lafayette College	2003

Professional Presentations

The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications July 2018
Taipei, Taiwan
Title: Cytoskeletal mechanics of asymmetrically dividing cells.

Workshop for Women in Mathematical Biology May 2018
Institute for Mathematics and its Applications, University of Minnesota
Title: Cytoskeletal mechanics of asymmetrically dividing cells: a mathematical modeling perspective.

Research Frontiers in Biomathematics Seminar November 2017
UCLA, Los Angeles, CA
Title: Mathematical models for asymmetric cell division.

University of Utah MathBio Alumni Conference July 2017
University of Utah, Salt Lake City, UT
<h3> Title: Intracellular spatiotemporal protein patterning in bacterial cells.

Applied Math Seminar April 2017
California State University Northridge, CA
Title: Intracellular spatiotemporal protein patterning in bacterial cells.

Mathematical Biosciences Institute Visitor Seminar March 2017
The Ohio State University, Columbus, OH
Title: Intracellular spatiotemporal protein patterning in bacterial cells.

International Symposium on Biomathematics and Ecology Education and Research October 2016
Charleston, SC
Title: Spatiotemporal protein patterns: The mathematics of cell division.

SIAM Conference on the Life Sciences July 2016
Boston, MA
Title: Mathematical Modeling of Dividing C. elegans Embryo Cell Mechanics.

11th AIMS Conference on Dynamical systems, Differential Equations and Applications July 2016
Orlando, FL
Title: Mathematical modeling of cellular nanomachines.

Mathematical Biology Seminar March 2016
University of California, Davis
Title: Mathematical modeling of cellular nanomachines.

Opening Workshop of the Stochastic Dynamical Systems in Biology: Numerical Methods and Applications Programme at the Isaac Newton Institute January 2016
Cambridge, UK
Title: Mathematical modeling of cellular nanomachines.

2015 Annual Meeting of the Society for Integrative and Comparative Biology January 2015
West Palm Beach, FL
Title: Interdisciplinary team approaches to mathematical modeling.

2014 Canadian Mathematical Society Summer Meeting, Winnipeg, Manitoba, Canada June 2014
Title: Mathematical models of force generation at the cellular nanoscale: Interplay of protein flexibility and diffusion.

Twin WiMSoCal, University of San Diego, San Diego CA May 2014
Title: Quantitative approaches for intra-cellular transport machines.

CCMS Colloquium, Harvey Mudd College, Claremont, CA April 2014
Title: Flexing the kinetochore muscle: Mathematical modeling of chromosome/microtubule connections

Western Fall Sectional Meeting of the American Mathematical Society, November 2013
UC Riverside, CA
Title: An interdisciplinary group approach to teaching Differential Equations: Experiences and challenges.

Applied Mathematics Seminar , Rensselaer Polytechnic Institute, Troy NY May 2013
Title: Mathematical Models of Chromosomal Nano-Machines: A Story of Attachment and Error.

Applied analysis and computation seminar, April 2013
University of Massachusetts at Amherst, Amherst MA
Title: Mathematical Models of Chromosomal Nano-Machines: A Story of Attachment and Error.

Mathematical Biology Seminar, University of Florida, Gainesville FL March 2013
Title: Mathematical modeling of polymer nano-machines.

Biology Department Seminar, Mount Holyoke College, South Hadley MA March 2013
Title: "Which way forward? Tales of transport and control at the cellular level.

Four College Biomathematics Consortium, Mount Holyoke College, S. Hadley MA, October 2012
Title: Force generation by cytoskeleton remodeling in dividing bacteria: A mathematical point of view.

MBI 10th Anniversary Meeting, Mathematical Biosciences Institute, September 2012
The Ohio State University, Columbus OH
Title: A model for load-dependence of mean microtubule attachment times with kinetochores: a catch-bond mechanism for error correction" (Invited Poster Presentation).

Society for Mathematical Biology Annual Meeting, Knoxville TN July 2012.
Title: Stochastic Modeling of Bacterial Chromosome Segregation.

MBI Partner Meeting, Mathematical Biosciences Institute, February 2012
The Ohio State University, Columbus OH
Title: Mathematical Modeling of Chromosome Movement in Bacteria" (Poster Presentation).

Center for Cell Analysis and Modeling, University of Connecticut Health Center April 2011
Title: A Mathematical Model of Force Generation Mechanisms at the Kinetochore/Microtubule Interface.

Math/Stat Club Seminar, Mathematics Department, Mount Holyoke College February 2011
Title: Biopolymer Brownian Motors.

2010 MBI Workshop for Young Researchers in Mathematical Biology August 2010
Ohio State University, Columbus OH
Title: A Mathematical Model for Force Generation Mechanisms at the Kinetochore-Microtubule Interface (Poster Presentation).

Biophysical Society 54th Annual Meeting, San Francisco, CA February 2010
Title: A Mechanomolecular Model for Chromosome Movement during Mitosis (Poster Presentation).

GSAC Graduate Colloquium , Mathematics Department, University of Utah, UT December 2009
Title: Mathematical Models of One-Shot Molecular Engines.

Nebraska Conference for Undergraduate Women in Mathematics, February 2004
University of Nebraska, Lincoln NE
Title: Knots, Ortho-Projection Matrices and Jones Polynomials.

Summer Undergraduate Research Conference in Mathematics, August 2003
The Ohio State University, Columbus OH
Title: Knots, Ortho-Projection Matrices and Jones Polynomials.

Professional Workshops and Organized Sessions

Special Session ("Mathematics meets Life") at the 12th AIMS Conference on Dynamical systems, Differential Equations and Applications July 2018
co-Organizer.

University of Utah MathBio Alumni Conference July 2017
co-Organizer.

Women advancing mathematical biology: understanding complex systems with mathematics; MBI Emphasis Workshop April 2017
co-Organizer.

Special Session ("Mathematics meets Life") at the 11th AIMS Conference on Dynamical systems, Differential Equations and Applications July 2016
co-Organizer.

Mathematical Association of America MathFest 2012, Madison WI August 2012
Project NExT Program Funded participant.

Mathematical Biosciences Institute, The Ohio State University February 2012
Robustness in Biological Systems Funded participant.

Mathematical Biosciences Institute, The Ohio State University October 2011
Stochastic Processes in Cell and Population Biology Funded participant.

Mathematics Department, University of Utah August 2010
Department of Mathematics Annual TA Training Workshop Co-organizer/workshop facilitator.

Mathematics Department, University of Utah May 2008
Mathematical Perspective on Cancer Immunology Funded participant.

The Center for Teaching and Learning Excellence, University of Utah November 2007
Developing Effective Assignments and Grading Rubrics in Higher Education Participant.

IGERT 3rd Annual Student Workshop, Mathematics Department, University of Utah — July 2007
Modeling and Simulation in the Life Sciences with Charlie S. Peskin — Participant.

IGERT 2nd Annual Student Workshop, Mathematics Department, University of Utah — May 2006.
Biological Polymers and Cell Motility with Leah Edelstein-Keshet — Participant.

Institute for Advanced Study/Princeton University — Summer 2004
Program for Women in Mathematics: Analysis and Nonlinear PDEs — Funded participant.

Professional Service

Guest Editor: *Letters in Biomathematics.*

Editor: *Springer Association for Women in Mathematics Series.*

Referee: *Journal of Theoretical Biology, Journal of Mathematical Biology, Bulletin of Mathematical Biology, Biophysical Journal, Letters in Biomathematics, PLOS Computational Biology, PLOS One*

NSF Grant Reviwer

Organizing Committee Member: Mathematical Biosciences Institute National Colloquium Series

College Service

Member, Pomona College Teaching and Learning Committee — 2017-2018

co-Chair, Claremont Center for Mathematical Sciences Colloquium — 2018-2019

Advisor to graduate students

An Do, 2016-present, Institute of Mathematical Sciences, Claremont Graduate University