

# Shalla Hanson

LJLL-UPMC, 4 Place Jussieu, F75252 Paris Cedex 05, FR  
120 Science Dr., Off. 274E, Durham, NC 27708, US  
✉ [shalla.hanson@duke.edu](mailto:shalla.hanson@duke.edu)  
🏠 [www.math.duke.edu/grad/shanson](http://www.math.duke.edu/grad/shanson)

## Education

- 2018 **PhD Mathematics**, *Duke University*, Durham, North Carolina, USA.
- 2018 **PhD Applied Mathematics**, *Université Pierre et Marie Curie*, Paris, France.  
Advisors: Michael C. Reed, Ph.D., Department of Mathematics, Duke University, and Jean Clairambault, Ph.D., M.D., Jacques-Louis Lions Laboratory, Université Pierre et Marie Curie & INRIA, Paris.
- 2015 **MA Mathematics**, *Duke University*, Durham, North Carolina.
- 2012 **Post-baccalaureate Certificate Mathematics**, *Smith College*, Northampton, Massachusetts.
- 2009 **BS Biochemistry**, *Southern Methodist University*, Dallas, Texas.

## PhD Thesis

Dynamic Optimisation of Anti-tumor Immunity in Rapidly Mutating Cancers: Manipulating the Evolutionary Trajectory.

## Current Research Interests

- *Interaction Dynamics in Heterogeneous and Opposing Populations, most specifically Evolving Cancer Cells and Responding Immune Cells.*
- *Designing Patient Specific Combination Chemo- & Immunotherapy Treatment Protocols for Glioblastoma.*
- *Dynamic Optimisation of CAR T Cell Therapy for B-ALL.*
- *Mathematical Modelling of T Cell Activation and Differentiation.*

## Selected Talks

- Jul. 2016 *Foreseeable Changes in Lymphocyte Phenotype May Shape Patient Responses to Immunotherapy*, 2016 joint meeting of the European Society for Mathematical and Theoretical Biology and the Society for Mathematical Biology, Nottingham, United Kingdom.
- Apr. 2016 *Impacts of T-cell Heterogeneity in Tumor Immunology*, Laboratoire Jacques-Louis Lions, Université Pierre & Marie Curie, Paris, France.
- Sep. 2015 *A Case for Consistency Among Opposing Models of T Cell Activation and Differentiation*, International Conference of Numerical Analysis and Applied Mathematics, Rhodes, Greece.
- May 2015 *Mathematical Analysis Reveals Plausibility of Misdiagnosis among Chemotherapy Patients: Specious Presentation of Immune Exhaustion Mimics Development of Resistance*. Duke University Workshop on Applications of Mathematics to Physiology and Medicine, Durham, North Carolina, USA.
- Apr. 2015 *Lessons from Mathematical Modeling of Tumor-Immune Dynamics*, Brain Tumor Immunotherapy Program, Duke University Medical Center, Durham, North Carolina., USA.

- Jan. 2013 *Mathematical Modeling of Zebrafish Spinal Cord Development: Ordinary Differential Equation Approximation for Spatially Inhomogeneous 2-dimensional Growth in a Circular Domain*, Joint Mathematics Meetings, San Diego, California, USA.
- Aug. 2011 *The Pros and Woes of Standardized Testing*, McDonalds Education Workshop, Houston, Texas, USA.

---

## Honors and Awards

- 2013-2017 NSF Research Training Grant DMS-0943760, Duke University.
- 2015-2016 Chateaubriand STEM Fellowship, Office for Science and Technology, Embassy of France, and INRIA.
- 2015 Triangle Graduate Fellowship in Evolutionary Medicine, National Evolutionary Synthesis Center & Triangle Center for Evolutionary Medicine.
- 2014 Howard Hughes VIP Fellowship, Duke University.
- 2012 Post-baccalaureate Research Fellowship, Smith College.
- 2010 Official Recognition for Founding & Directing the St. Vincent's Patient Assistance Program, University of Texas Medical Branch School of Medicine.
- 2009 Leonard Andrews Scholarship Recipient, Southern Methodist University.
- 2008 Cheatum-Longnecker Scholarship Recipient, Southern Methodist University.
- 2004-2006 Centennial Scholarship, Lee University.

---

## Publications

- 2016 **Hanson S**, Grimes DR, Taylor-king JP, Bauer B, Warman PI, Frankenstein Z, et al. *Toxicity Management in CAR T cell therapy for B-ALL: Mathematical modelling as a new avenue for improvement*. BioRxiv 2016. Available from: <http://dx.doi.org/10.1101/049908>.
- 2016 **Hanson S**, Taylor-King JP, Grimes DR, Warman PL, Bonassar MJ, Arango A, and Davila M. *Designing Patient Specific Protocols for Anti-CD19 CAR-T Cell Therapy with Ancillary Immunomodulation in B Cell Acute Lymphoblastic Leukemia*. Note: In Preparation 2016.
- 2016 **Hanson S** and Sanchez-Perez L. *Distinguishing Functional from Phenotypic Characterizations of T Cell Subsets is Necessary for the Resolution of the Current Debate on T Cell Activation Pathways*. Note: In Preparation 2016.
- 2015 Ortiz L, Reed M, and **Hanson S**. *Modeling of Oncolytic Virotherapy & Immune Responses in Cancer Therapy*. ABRCMS 2015.
- 2013 **Hanson S**, Zaccheo K. *Modeling Zebrafish Spinal Cord Development*. JMM Preliminary Report 2013.

---

## Special Session Workshops Attended

- Jul. 2016 Minisymposia on Tumor-Immune Dynamics and Virotherapy, 2016 joint meeting of the ESMTB & SMB, University of Nottingham, Nottingham, UK.
- Mar. 2016 INRIA & Cancer Days, INRIA-Paris, Paris, FR.
- Nov. 2015 IMO Workshop 5: Immune Cancer, Integrative Mathematical Oncology, Moffitt Cancer Center & Research Institute, Tampa, FL, USA.

- Sep. 2015 ICNAAM Symposium on Mathematical Models and Methods to Investigate Heterogeneity in Cell and Cell Population Biology, Rhodes, Greece.
- Aug. 2015 CMO-BIRS Workshop on Viral Dynamics and Cancer: Modeling Oncogenic and Oncolytic Viruses, Casa Matematica Oaxaca, Oaxaca, Mexico.
- Jun. 2015 CAMBAM-MBI-NIMBioS Workshop on Nonlinear Dynamics in Biological Systems, Montreal, Canada.
- Mar. 2015 MBI Workshop on Targeting Cancer Cell Proliferation and Metabolism Networks, Mathematical Biosciences Institute, Columbus, Ohio, USA.
- Feb. 2015 MBI Workshop on Treatment, Clinical Trials and Resistance of Cancer, Mathematical Biosciences Institute, Columbus, Ohio, USA.
- Jan. 2015 AIM Workshop on Tumor-immune Dynamics, American Institute of Mathematics, San Jose, California.

## Public Health Experience

- 2013 *Senior Health Policy Analyst*, Program Effectiveness and Sustainability, State Consulting, The Lewin Group, Washington, District of Columbia.
- 2010-2011 *Director and Founder of the St. Vincent's Clinic Patient Assistance Program*, University of Texas Medical Branch, School of Medicine, Galveston, Texas.

## Teaching Experience

### Undergraduate Research Mentored

- Summer 2015 L Ortiz, (Metropolitan University of San Juan, Puerto Rico) Co-mentored during the Duke University Summer REU in Mathematical Biology. Project: *Modeling of Oncolytic Virotherapy & Immune Responses in Cancer Treatment*.
- Summer 2015 Laurel Bates (Appalachian State University), Mentored during the Mathematics Applied to Physiology and Medicine Workshop at Duke University, Project: *Mathematical Modeling of Oncolytic Virotherapy*.
- 2014-2015 Mario Khalil (Duke University), Co-mentored during the Howard Hughes Vertically Integrated Partners Program and Continued Collaboration through the Subsequent Academic Year, Projects: *Mathematical Modeling of Arsenic Detoxification*, and *Dynamics of Disulfide Linking in Human Plasma and Theoretical Optimization of N-acetylcysteine Therapy in Acetaminophen Overdose*.
- Summer 2014 Thomas Debo (Arizona State University) and Kayleah Cumpian (Northeast Texas Community College), Mentored during the Mathematics Applied to Physiology and Medicine Workshop at Duke University, Project: *The Effects of Chemotherapy on Tumor Growth and Angiogenesis*.

### Teaching Assistantships

- 2013 Calculus I, Department of Mathematics, Duke University.
- 2012 Calculus I, II, III, and Linear Algebra, Department of Mathematics, Smith College, and College Algebra, Spinelli Center for Quantitative Learning, Smith College.
- 2006 General Physics I, Department of Natural Science and Mathematics, Lee University.

### Instruction

- 2013-2015 *Assorted lectures* in Introductory Calculus and Real Analysis, Duke University, Durham, North Carolina.

2009-2010 Options for Health Care Funding for the Indigent Population, University of Texas Medical Branch School of Nursing, Galveston, Texas.

## Professional Memberships

Society for Industrial and Applied Mathematics (SIAM)

Society for Mathematical Biology (SMB)

American Mathematical Society (AMS)

Association for Women in Mathematics (AWM)

Sigma Xi

## Relevant Skills

Programming and Computation

MATLAB, Scilab, html, Mathematica, Maple, JMP, SAS, R, LaTeX.

Language Proficiencies

English (Native), Spanish (Fluent), French (Beginner)