

CONTACT INFORMATION	Department of Mathematics Virginia Tech 225 Stanger Street (MC 0123) Blacksburg, Virginia 24061	E-mail: lfstrube@vt.edu
RESEARCH INTERESTS	Mathematical biology (systems biology, cellular and molecular biology, immunology), dynamical systems, stochastics, emergent behavior of complex biological systems, immune system decision-making, gene regulation networks, signal transduction pathways, integrated stress response, unfolded protein response.	
CURRENT POSITION	Virginia Tech , Blacksburg, VA Postdoctoral Associate Department of Mathematics (2020 - present) Department of Biological Sciences (2018-2020) <i>Tyson Lab of Computational Biology</i>	October 2018 - present
EDUCATION	The University of Utah , Salt Lake City, UT Ph.D., Mathematics <i>Advisor:</i> Frederick R. Adler <i>Thesis:</i> A Mathematical Model of Translation Regulation by the Integrated Stress Response M.S., Mathematics The University of Texas at Tyler , Tyler, TX B.S., Mathematics and Biology Summa Cum Laude <i>Advisor:</i> J. Regan Beckham, Department of Mathematics <i>Senior Project:</i> The Effect of Entropy on Protein Folding	December 2018 May 2014 December 2009
PUBLICATIONS	LF Strube, M Walton, and LM Childs. The role of repeat infection in the dynamics of a simple model of waning and boosting immunity. <i>Journal of Biological Systems</i>. Vol. 29, No. 2 (2021) 1–22. In Preparation LF Strube, RP Hughes, and LM Childs. The role of infection on shifts in population cycles in a discrete-time epidemic model. LF Strube, L Li, and JJ Tyson. Mathematical modeling elucidates network motifs responsible for complex differentiation phenomena in immune cells. LF Strube, FR Adler. A mechanistic ODE model of the integrated stress response reveals a “tug-of-war” motif that produces an analog-digital response tuned by eIF2B Non Peer-Reviewed Proceedings and Abstracts RI Chapman, LF Strube, B Bextine. Population genetics of the potato psyllid: Impacts on zebra chip epidemiology. 2010 Proceedings of the 10th Annual Zebra Chip Reporting Session, 2010.	

PAST POSITIONS	The University of Utah , Salt Lake City, UT	2010-2018
	RTG Graduate Fellow, Department of Mathematics	
	Graduate Research Assistant, Adler Research Group, Department of Mathematics	
	Graduate Teaching Assistant, Department of Mathematics	
	<i>Advisor: Fred Adler</i>	
	The University of Texas at Tyler , Tyler, TX	
	Undergraduate Research Assistant	2006-2007, Summer 2010
	Bextine Insect Genomics and Phytopathology Research Lab	
	<i>Advisor: Blake Bextine</i>	
	Supplemental Instruction Leader	Fall 2006
FUNDING	General Biology I	
	<i>Course Instructor: Lee Ann Harbison</i>	
	SIAM Life Sciences Early Career Travel Award	\$650 July 2022
	AWM Research Symposium Travel Award	\$1500 June 2022
	BAMM! Conference Travel Award	\$530 May 2022
	AMS-Simons Travel Grant	\$5,000 July 2021- June 2023
	<i>A Logical Ordinary Differential Equation Model of Priming and Tolerance Heterogeneity in Immune System Monocytes</i>	
	Virginia Tech Faculty Writing Group Grant	July 2021 - May 2022
	Convenor: Janet Abbate	\$2,000 (my portion: \$185)
	Senior Personnel: Andrea Bertke, Marcia F. Feuerstein, Kendall Giles, Mahmood Kahn, Fabian Prieto-Nanez, Laura F. Strube , Robert Weiss, Ariana Wyatt, Stephanie E. Zick.	
AWARDS AND HONORS	Mathematics Department Travel Award, Univ. of Utah	\$500 Jan 2019
	Landahl Travel Award, Society of Mathematical Biology	\$250 Jul 2019
		\$100 Jul 2015
	Pacific Northwest National Laboratory Poster Prize for Overall Best Postdoctoral Researcher, SMB Annual Meeting (Virtual)	Summer 2021
	<i>Title: Logical models reveal the complex immune cell differentiation phenomena produced by the MISA motif</i>	
	Student Nomination: Virginia Tech, Favorite Faculty Award	Spring 2021
	NC State Univ. Virtual Building Future Faculty Program Participant	Spring 2021
	Mathematics Outstanding Graduate Student Award, Univ. of Utah	Spring 2018
	AMS Math Research Community (MRC) Participant	Summer 2016
	<i>Topic: Mathematics in Physiology and Medicine</i>	
	Student Nomination: University of Utah Faculty Teaching Award	Fall 2015
	Mathematics Graduate Fellowship, University of Utah	2013-2015, 2010-2011
	<i>NSF Research Training Grant in Mathematical and Computational Biology</i>	
	Undergraduate University Honors, Summa Cum Laude	Fall 2009

AWARDS AND HONORS (CONT.)	Dupont Poster Presentation Award, SACNAS National Conference	Fall 2009
	<i>Title: Minimal Surfaces in Four-Dimensional Euclidean Space</i>	
	Cornell Summer Math Institute (SMI) Participant, Ithaca	Summer 2009
	UT Tyler Cranford Scholar Award, Mathematics	Spring 2009
	UT Tyler Outstanding Student in Biochemistry Award	Spring 2008
	Tri Beta Biological Honor Society	Fall 2006
	UT Tyler Regents Scholarship	Fall 2004 - Spring 2008
CONFERENCE SPECIAL SESSION ORGANIZATION	European Conference on Mathematical and Theoretical Biology	Sept. 2022
	<i>Co-organized Session: SMB Writing Groups: Showcasing the research of one group to highlight the role of writing groups in the development of early-career researchers</i>	
	<i>Presentation: A mechanistic ODE model of the integrated stress response reveals a "tug-of-war" motif that produces an analog-digital response tuned by eIF2B</i>	
	Joint Mathematics Meeting	January 2017
	<i>Co-organized Session: (A Mathematics Research Communities Session)</i>	
	AMS special session on mathematics in physiology and medicine	
	AMS Spring Western Sectional Meeting	April 2016
	<i>Co-organized Session: Structure and emergent properties of biological networks</i>	
CONFERENCES AND INVITED TALKS	Invited Talks	
	SIAM Life Sciences, Pittsburgh	July 2022
	<i>The role of infection on shifts in population cycles in a discrete-time epidemic model</i>	
	Assoc. for Women in Mathematics Research Symposium, Minneapolis	June 2022
	<i>The role of infection on shifts in population cycles in a discrete-time epidemic model</i>	
	UC Merced, Mathematical Biology Seminar, Merced	March 2022
	<i>The role of repeat infection in the dynamics of a simple model of waning and boosting immunity</i>	
	Virginia Tech Mathematical Biology Seminar, Blacksburg	November 2021
	<i>The role of repeat infection in the dynamics of a simple model of waning and boosting immunity</i>	
	Jing Chen Research Group Meeting, VT Dept. of Biology, Blacksburg	August 2021
	<i>An analysis of the role of infection in the shifting bifurcation structure of periodic discrete-time population models.</i>	
	Jing Chen Research Group Meeting, VT Dept. of Biology, Blacksburg	December 2020
	<i>Mathematical modeling elucidates network motifs responsible for complex differentiation phenomena in immune cells</i>	
	Iowa State Mathematical Biology Seminar, Ames (virtual)	September 2020
	<i>The role of repeat infection in the dynamics of a simple model of waning and boosting immunity</i>	
	Jing Chen Research Group Meeting, VT Dept. of Biology, Blacksburg	August 2020
	<i>The role of repeat infection in the dynamics of a simple model of waning and boosting immunity</i>	
	Jing Chen Research Group Meeting, VT Dept. of Biology Blacksburg	January 2020
	<i>Heterogeneous priming and tolerance in the innate immune system</i>	
	Jing Chen Research Group Meeting, VT Dept. of Biology, Blacksburg	March 2019
	<i>Translation regulation by the integrated stress response</i>	

CONFERENCES
AND INVITED
TALKS(CONT.)

Invited Talks (cont.)

- Virginia Tech Mathematical Biology Seminar, Blacksburg January 2019
A mathematical model of translation regulation by the integrated stress response: The ISR as an analog-digital mechanism tuned by eIF2B
- DECART Summer School: Data Science for Healthcare, Salt Lake City July 2018
Using mathematics to study molecular pathways: A dynamical systems model of the integrated stress response
- Graduate Student Colloquium, Univ of Utah, Salt Lake City October 2013
Cellular Stress: The development of an ODE model describing PKR-induced translation attenuation in response to pox virus infection
- Mathematical Biology Seminar, Univ. of Utah, Salt Lake City September 2013
 RTG Lab Rotation Report: Elde Lab
Ordinary differential equation model of the cellular response to poxvirus infection
- Mathematical Biology Seminar, Univ. of Utah, Salt Lake City September 2012
 RTG Lab Rotation Report: Julie Hollien Lab
Poly A chromatography via salt concentration
- Mathematical Biology Seminar, Univ. of Utah, Salt Lake City September 2011
 RTG Lab Rotation Report: David Stillman Lab
- Summer Math Institute, Cornell, Ithaca August 2009
Minimal Surfaces in Four Dimensions
 Co-presenters: Alex Barrios and Eteri Svanidze

Contributed Talks

- Biology and Medicine through Mathematics (BAMM!), Richmond May 2022
The role of infection on shifts in population cycles in a discrete-time epidemic model
- Joint Math Meetings, Online January 2021
The role of repeat infection in the dynamics of a simple model of waning and boosting immunity
- Society for Mathematical Biology Annual Meeting, Online (eSMB) August 2020
The role of repeat infection in the dynamics of a simple model of waning and boosting immunity
- Biology and Medicine Through Mathematics Conference (BAMM!) ~~May 2020~~
 Covid-19 Cancellation
The role of repeat infection in the dynamics of a simple model of waning and boosting immunity
- Society for Mathematical Biology Annual Meeting, Montreal July 2019
Activation of the integrated stress response: Does it tune or tame?
- Joint Math Meetings, Baltimore January 2019
A mathematical model of translational regulation by the integrated stress response: The ISR as an analog-digital mechanism tuned by eIF2B
- Society for Mathematical Biology Annual Meeting, Salt Lake City July 2017
A mathematical model of translational regulation by the integrated stress response
- Joint Math Meetings, Atlanta January 2017
A mathematical model of translational regulation by the integrated stress response
- AMS Spring Western Sectional Meeting, Salt Lake City April 2016
A mathematical model of translational regulation by the integrated stress response
- Society for Mathematical Biology Annual Meeting, Atlanta July 2015
Translational regulation by the integrated stress response
- Mathematical Modeling in Health Sciences Summit, Salt Lake City October 2014
The integrated stress response: Translation attenuation as a stress response strategy
- Mathematical Association of America, Texas Sectional Meeting, Spring 2008
Genetic algebra (Abstract Algebra and RNA codons)
- Texas Undergraduate Mathematics Conference, Huntsville Fall 2007
Searching for extensions (Abstract Algebra)

CONFERENCES
AND INVITED
TALKS

Contributed Posters

- European Conference on Mathematical and Theoretical Biology **September 2022**
Logical models reveal the roles of MISA-type gene regulatory motifs in governing complex differentiation decisions made by immune cells
- 5th Workshop on Virus Dynamics, Virtual **October 2021**
Logical models reveal the roles of MISA-type gene regulatory motifs in governing complex differentiation decisions made by immune cells
- Society for Mathematical Biology Annual Meeting, Virtual **June 2021**
Logical models reveal the complex immune cell phenomena produce by the MISA gene regulatory motif
- Society for Mathematical Biology Annual Meeting, Heidelberg **September 2020**
 Covid-19 Cancellation
The role of repeat infection in the dynamics of a simple model of waning and boosting immunity
- Evolutionary Genetics Retreat, Salt Lake City **November 2014**
A mathematical model of the integrated stress response with applications to ER stress and poxvirus infection
- SACNAS National Conference, Dallas **October 2009**
Minimal surfaces in four-dimensional euclidean space

MENTORING/
SUPERVISORY
EXPERIENCE

University of Utah, Department of Mathematics

Research Mentor

- International Science and Engineering Fair Research Mentor **2015 - 2016**
 Students: Annie Yun and Yang Yan
Met regularly with two high school students as they explored receptor-ligand-decoy dynamics using ODE modeling and stochastic simulation.
- First Place in Physics, Math, and Astronomy at Salt Lake Valley Science and Engineering Fair
 - Grand Prize Winner at SLVSEF
 - Intel International Science and Engineering Fair Finalist
- High-School summer research program in mathematical biology **Summer 2014**
 Students: Olivia Dennis and Rajdeep Trilokekar
Developed and obtained funding for a 8-week "REU-like" research program for two high school students on the topic of mathematically modeling viral infection at the cellular level. Met with students daily as they developed an ODE and cellular automata models of viral infection.

Graduate Journal Club Co-Mentor

- MATH 7875 Math Bio Graduate Journal Club **Fall 2013 - Spring 2015**
Developed a course syllabus and mentored 1st and 2nd year graduate students as they learned to read and present primary literature in the field of mathematical biology. Led weekly discussions. Met with students individually to discuss paper selection and content, presentation preparation, and to give post-presentation feedback.

TEACHING

Virginia Tech, Department of Mathematics*Instructor of Record*

MATH 2114: Introduction to Linear Algebra	Fall 2021, Spring 2022
MATH 1225: Calculus of a Single Variable	Fall 2020, Spring 2021
<i>Implemented an online “flipped-classroom” course.</i>	

Guest Lectures

MATH 5516: Modeling and Simulation of Biological Systems II	Spring 2020
<i>Topic: Long-term behavior and stability analysis of discrete dynamical systems</i>	

Virginia Tech, Department of Biological Sciences*Teaching Assistant*

GBCB 5424: Computational Cell Biology	Spring 2019
<i>Guest-lectured a unit on stochastic simulation of biological systems. Prepared solutions for and graded all homework assignments and exams.</i>	
SYS 3115: Network Dynamics and Cell Physiology	Fall 2018
<i>Assessed student oral presentations on the topic of mathematical modeling of gene regulatory networks for a class of ~ 20 advanced undergraduate students.</i>	

University of Utah, Department of Mathematics*Instructor of Record*

Supervised graduate lab TA's, undergraduate learning assistants, and grading assistants.

MATH 2250: Differential Equations and Linear Algebra	Summer 2018
MATH 1210: Calculus I (~ 100 students)	Spring 2018
MATH 1090: Online Business Algebra	Fall 2017
MATH 1090: Business Algebra	Spring & Fall 2012, Spring 2013, Fall 2016
MATH 1320: Engineering Calculus II Lecture	Fall 2015
MATH 13: Bridge to Engineering Calculus	Fall 2015
MATH 1050: College Algebra	Summer 2015

Teaching Assistant

Prepared real-world application problem sets with a team of TAs and supervised student groups in a weekly lab course.

MATH 2250: Differential Equations and Linear Algebra (Engineering Calculus Sequence)	Fall 2011, Spring 2016
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University of Texas at Tyler, Office of Academic Support*Supplemental Instruction Leader*

Designed study materials and active-learning exercises to facilitate student learning in group study sessions.

BIOL 1306: General Biology I	Fall 2006
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Math Tutor

University of Utah, Math Tutoring Center	Fall 2017, Fall 2016, and 2011 - 2013
Private Tutor	Fall 2001 - Spring 2008

PEDAGOGY AND
DIVERSITY
TRAINING

- Mastery Grading Conference, Virtual Conference Summer 2020
Attended: Two-day workshop-style conference organized by mathematics faculty.
- The Office of Undergraduate Research, Virginia Tech Spring 2020
Attended: Mentoring Undergraduate Research Workshop
- The Center for Excellence in Teaching and Learning, Virginia Tech Fall 2019
Attended: Transform Your Lectures with Presentation Techniques and Active Learning Strategies Workshop
- LGBT Resource Center, University of Utah Fall 2016
Attended: Gender and Sexuality; Workshop promoting inclusion in academics
- University Teaching Fellowship Proposal, Univ. of Utah (not funded) Spring 2016
 Proposal: Studying the Effects of Structured Formative Assessment on Major Learning Outcomes in Engineering Calculus
 Mentor: Will Nesse, Department of Mathematics, University of Utah
- Developed a proposal in collaboration with a faculty member for a two-semester project designed to produce formative assessment course materials for a second semester Engineering Calculus course.*
- Department of Mathematics Teaching Workshop, University of Utah Fall 2010

NON-DEGREE AND
SHORT COURSES

- AMS Mathematics Research Community** Summer 2016
 Mathematics in Physiology and Medicine, Snowbird, UT
Research Project: Vascular Response in Hypertension
Research Mentor: Brian Carlson
- Summer Math Institute, Cornell University, Ithaca, NY** Summer 2009
Course: Abstract Algebra
Research Project: Minimal Surfaces in Four-Dimensional Euclidean Space
Co-Authors: Alex Barrios and Eteri Svanidze
Advisors: Matt Noonan and Mutiara Sundjaja
SACNAS 2009: Awarded the Dupont Poster Presentation Award for my presentation of our work.
- University of Texas at Tyler, Independent Study** Spring 2008
Research Project: Genetic Algebra (abstract algebra applied to genetics)
Advisor: Ramona Ranalli-Alger
- University of Texas at Tyler Summer REU** Summer 2007
Research Project: Searching for Extensions (abstract algebra)
Advisor: Kazem Mahdavi

LABORATORY
EXPERIENCE**The University of Utah, Lab Rotations**

Elde Lab, Dept of Human Genetics Summer 2013

*Project: A Mathematical Model of of the Integrated Stress Response with Applications to ER Stress and Poxvirus Infection**Preliminary development of an ODE model for translation attenuation by the Integrated Stress Response.*

Julie Hollien Lab, Dept of Biology Summer 2012

*Project: PolyA Chromatography via Salt Concentration**Developed a Protocol for fractioning mRNA pools by their polyA tail lengths via elution from a oligo(dt) column using sodium citrate saline.*

David Stillman Research Lab, Dept of Pathology Summer 2011

*Project: Mating Type Determination in Budding Yeast**Did work towards elucidation of the molecular basis for mating type determination in budding yeast: culturing yeast, RNA extraction, ethanol precipitation, cDNA production, RT-qPCR.***The University of Texas at Tyler, Undergraduate Research Assistant**

Bextine Lab, Dept of Biology (Plant Pathology) 2006 - 2007, 2010

*Assisted graduate students on projects involving insect vectors for the plant diseases Zebra Chip Disease (potatoes) and Pierce's Disease (grapevines). Developed and maintained a catalog of processed DNA samples, created a protocol handbook containing detailed instructions for a multistep research project, participated in the training of new research assistants, cDNA library construction, culturing and transforming *E.coli*, DNA extraction and purification, gel electrophoresis, DNA sequencing.*

OUTREACH

Presentations

Univ. of Washington Bothell Summer Mathematics REU, Bothell Summer 2016

Bound for Graduate School: Perspectives and Experiences from the Other Side

Univ. of Texas at Tyler Summer Mathematics REU, Tyler Summer 2016

Getting to Graduate School: Perspective from the Other Side

Univ. of Texas at Tyler Summer Mathematics REU, Tyler Summers 2013 - 2014

*Let's Talk Grad School!***Volunteer**

Poster Judge

Virginia State Science and Engineering Fair

April 2019

MAA Undergraduate Poster Session, Joint Math Meetings

January 2019

SERVICE

Society for Mathematical Biology (SMB)

SMB Mentoring Task Force, postdoc cohort committee Fall 2021 and Spring 2022
 SMB Mentoring Task Force, accountability group facilitator Spring 2021
 Annual Meeting Mentorship Program, Mentor Summer 2020,2021

Virginia Tech, Department of Mathematics Sciences

STRIVE for More Meeting, Virginia Tech (Virtual) October 2020, 2021
Volunteer at the “Success Through Rewarding and Inclusive Virtual Experience Mathematics-Opportunities in Research and Education” (MORE) meeting for undergraduates.
 MORE Meeting, Virginia Tech October 2019
Volunteer at the “Mathematics-Opportunities in Research and Education” (MORE) meeting for undergraduates.

Virginia Tech, Department of Biological Sciences

Presentation Judge, Department of Biological Sciences Research Day February 2020
 Poster Judge, Department of Biological Sciences Research Day February 2019

University of Utah, Department of Mathematics

Society for Mathematical Biology, Annual Meeting Summer 2017
Local organization team, designed conference “swag”
 Graduate Recruitment Research Lightening Talks Spring 2015, 2016
Mathematics Department, University of Utah
 Graduate Student Advisory Committee, Mathematics Dept, University of Utah
Retention, Promotion, and Tenure Committee Fall 2015 - Spring 2017
 Association for Women in Mathematics, University of Utah
 AWM Student Chapter President Fall 2011 - Summer 2012
Facilitated the establishment of the student chapter after several years of inactivity.

The University of Texas at Tyler, Department of Mathematics

Undergraduate Math Club
Vice-President, President 2007-2008
Participated in and led a leadership team of 3-4 undergraduate students who collectively developed extracurricular activities to facilitate a strong undergraduate community within the math department.

PROFESSIONAL
MEMBERSHIPS

American Mathematical Society
 Association for Woman in Mathematics
 Mathematical Association of America
SIGMAAs: Mathematical Biology and Inquiry-Based Learning
 Society for Industrial and Applied Mathematics
Activity Group: Life Sciences
 The Society for Mathematical Biology
Subgroup: Infection and Immunity, Epidemiology

ADDITIONAL
SKILLS

Scientific Computing: MATLAB, Mathematica, XPPAUT, L^AT_EX