Hannah Reine Biegel

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Education

University of Arizona Tucson, AZ
Doctor of Philosophy in Mathematics, Minor in Applied Mathematics *Expected Dec 2020*

Graduate Certificate in Statistics
Computational & Mathematical Modeling of Biomedical Systems Trainee (Jul 2017 – May 2019)
Honors: Galileo Circle Scholar (Spring 2019, Spring 2020), College of Science Service Award (Spring 2019), PEO Scholar Nominee (Fall 2018)

University of Arizona Tucson, AZ
Master of Science in Mathematics *May 2018*

Thesis Title: *Forecasting influenza using a simple model and data assimilation*
Advisor: Joceline Lega, Ph.D.

University of Portland Portland, OR
Bachelor of Science in Mathematics and Biology, Magna Cum Laude *May 2015*

Honors: Dean's List (all semesters), Recipient of President's Scholarship (all semesters), Recipient of the Dundon-Berchtold Fund for Moral Advancement Scholarship, Recipient of Timothy Bergquist Endowed Math Scholarship (Fall 2014)

Research Projects

COVID-19 Forecasting Project Tucson, AZ
Graduate Student Researcher *Mar 2020 – Present*

Forecast the ongoing SARS-CoV-2 pandemic by downloading and processing daily death and cases counts at the state and US national levels; submit probabilistic forecasts weekly to COVID-19 Forecast Hub for "University of Arizona" team; work partially supported by NSF RAPID Grant # 2028401 (P.I. Faryah Sahneh, Co-P.I. Joceline Lega)
Advisor: Joceline Lega, Ph.D.

Influenza Forecasting Project Tucson, AZ
Graduate Student Researcher *Nov 2017 – Present*

Study the spread of influenza in the United States using dynamical system models and data assimilation; forecast the course of the 2017-18, 2018-19, and 2019-20 seasonal influenza outbreaks in the United States; work partially supported by NIH Grant # GM084905
Advisor: Joceline Lega, Ph.D.

Mosquito Modeling Project Tucson, AZ
Graduate Student Researcher *Jan 2017 – Present*

Study population dynamics of mosquitos for the purpose of vector control; investigate applications of incorporating environmental data into agent-based model of mosquito abundance; study applications of mosquito dynamics and vector control on disease dynamics of mosquito-borne diseases; perform sensitivity analysis on model; work partially supported by NIH Grant # GM084905
Advisor: Joceline Lega, Ph.D.

Group Theory in Biology; Research Training Group (RTG) Tucson, AZ
Graduate Student Researcher *Aug 2016 – Dec 2016*

Research the applications of group theory in biological modeling; in particular, learn about a model of quadruped locomotion based on a system of ordinary differential equations; use symmetry in the model and group theory to understand solutions
Advisor: Klaus Lux, Ph.D.

Modeling of Cell Motility Portland, OR
Undergraduate Researcher *Aug 2013 – May 2014*

Conduct research on a mathematical model of cell motility involving the stochastic modeling of focal adhesion formation; focus on sensitivity analysis of stochastic models; formalize results for a presentation and a poster symposium
Advisor: Hannah Callender Highlander, Ph.D.

Applied Ethics Research Portland, OR
Dundon-Berchtold Student Fellow *Aug 2014 – May 2015*

Create proposal for fellowship program; research ethical and unethical behavior involved in the use of mathematical models in a variety of fields; Objective: to educate the University of Portland community on the importance of understanding mathematical models
Advisor: Hannah Callender Highlander, Ph.D.

Mathematical Biosciences Institute REU Columbus, OH
Research Experience for Undergraduates (REU) Participant *June 2014 – Aug 2014*

Work on a mathematical model of prostate cancer treatment with mentors at Arizona State University; test a variety of models' capabilities of predicting off-treatment duration; formalize results for a presentation and a poster symposium
Advisors: Yang Kuang, Ph.D., and Fabio Milner, Ph.D.

Publications

Biegel, H.R., Quackenbush, A., & Highlander, H.C. (2017). Sensitivity analysis for stochastic and deterministic models of nascent focal adhesion dynamics. *International Journal of Biomathematics*, 10(07), 1750105. DOI: 10.1142/S1793524517501054

Programming Languages

Matlab, Python, R, NetLogo

Presentations

"Real-Time Forecasting of Influenza-Like-Illness in the United States" Tempe, AZ
ICMA VII, poster, 1st place for poster presentation *Oct 2019*

"Forecasting the Flu with Simple Nonliear Models' Atlanta, GA
CDC/CSTE Flu Forecasting Workshop, poster *Aug 2019*
Collaborator: Joceline Lega

"Forecasting Seasonal Influenza" Oracle, AZ
Arizona-Los Alamos Days *Apr 2019*

"Forecasting Seasonal Influenza" Tucson, AZ
U2 Can UQ *Apr 2019*

"Application of data assimilation in forecasting of influenza in the United States" Tempe, AZ
Biomathematics and Ecology Education Research Symposium (BEER-XI) *Oct 2018*

"Incorporating data assimilation methods in a simple model for influenza" Portland, OR
AMS Western Sectional Conference, Special Session on Biomathematics *Apr 2018*

"Epidemic Forecasting Using Data Assimilation" Tucson, AZ
U2 Can UQ Conference *Mar 2018*

"Sensitivity Analysis on an Updated Model of *Aedes aegypti* Abundance" Tucson, AZ
ICMA VI, poster *Oct 2017*

"Introduction to a Weather-Dependent Model of Mosquito Abundance" Tucson, AZ
Graduate Student Colloquium *Oct 2017*

"Modeling Quadruped Locomotion" Tucson, AZ
UA Department of Mathematic's RTG Mini-Conference *Dec 2016*

"Implications of Multiple Sensitivity Analysis Techniques in Stochastic Models of Focal Adhesion Dynamics" Bedlewo, Poland
Micro and Macro Systems in Life Sciences, poster *Jun 2015*

"A Comparison of Variance-Based and Screening Methods of Sensitivity Analysis of Stochastic Models of Focal Adhesion Dynamics" Portland, OR
University of Portland's Founders' Day *Apr 2015*

"Implications of Multiple Sensitivity Analysis Techniques in Stochastic Models of Focal Adhesion Dynamics" Cheney, WA
National Conference on Undergraduate Research (NCUR) *Apr 2015*
Collaborator: Alex Quackenbush

"Ethical Implications in the Use of Mathematical Models" Portland, OR
Dundon-Berchtold Applied Ethics Capstone Dinner *Apr 2015*
Collaborator: Dr. Hannah Callender

"Predicting Off-Treatment Duration in Prostate Cancer Patients" Columbus, OH
MBI 2014 Undergraduate Capstone Conference, oral and poster *Aug 2014*
Collaborators: Jake Weissman and Casey Shiring

"Sensitivity Analysis of Stochastic Models of Cell Motility" Portland, OR
MAA's MathFest 2014 *Aug 2014*
Collaborator: Alex Quackenbush

"Sensitivity Analysis of Stochastic Models of Cell Motility" Portland, OR
University of Portland Founder's Day, poster *Apr 2014*
Collaborator: Alex Quackenbush

Teaching and Mentoring Experience

Graduate Student Mentoring Program Coordinator Tucson, AZ
University of Arizona - Department of Mathematics *Jul 2018 – Present*
Propose and implement new graduate student mentoring program aimed at connecting first and second year Ph.D. students with more senior Ph.D. students in programs associated with the mathematics department (math, applied math, and statistics); organize networking events; pair mentors with mentees; listen to and address concerns of participants in the mentoring program

Graduate Teaching Associate/Assistant Tucson, AZ
University of Arizona - Department of Mathematics *Aug 2015 – Present*
Act as sole instructor and point of contact for students; prepare and present lectures; hold office hours and grade homework; write, proctor, and grade exams; assign undergraduate course grades

New Start Interim Math Coordinator Tucson, AZ
University of Arizona - New Student Experiences *Jun 2018 – Jul 2018*
Act as liaison between mathematics instructors/tutors and the coordinating team for the New Start summer bridge program. Communicate needs of instructors and students; help tutors prep the course material; resolve issues that arise; coordinate the official New Start social media team. New Start is a 6-week program for incoming freshmen, traditionally aimed to support minority or first-generation college students' transitions into the university.

Research Mentor for Undergraduate Students Tucson, AZ
University of Arizona - Department of Mathematics *Spring 2017, Spring 2018*
Provide guidance to junior and senior undergraduates for the UA capstone mathematical modeling course research project; answer questions and facilitate group meetings; provide feedback on research presentations

Mathematics Tutor Portland, OR
University of Portland - Department of Mathematics *Aug 2013 – May 2015*
Offer assistance in a patient manner to students who need help in Pre-Calculus, Finite Mathematics, Business Calculus, Bio-Calculus, Calculus I, Calculus II, Linear Algebra, Discrete Mathematics, and Statistics; meet with students at all levels in the Math Resource Center four times a week; meet individually with students for one-on-one tutoring sessions

Courses Taught

University of Arizona — Tucson, AZ
Aug 2015 – Present

New Start Math 112: College Algebra (2 sections)†

Math 112: College Algebra (3 sections)

Math 120R: Precalculus (1 section)

Math 116: Business Calculus (2 sections)

Math 122B: Calculus I (1 section)

Math 163: Basic Statistics (1 section)

† New Start Math 112 is a summer course for incoming freshmen, primarily minority and first-generation students. The class is taught in a collaborative classroom environment and meets for more hours than a standard 3-credit course. In-class activities are split between interactive lecture and student-driven problem solving.

Community Engagement

Tucson, Arizona

Association for Women in Mathematics
Secretary, Vice President of University of Arizona's Chapter — *Jan 2017 – Present*

Sonia Kovalevsky Day — *Spring 2018, Spring 2019*
Program Director

Tucson Festival of Books - Science City — *Mar 2018*
Volunteer

Humane Society of Southern Arizona — *Aug 2015 – Jan 2016*
Weekly volunteer

Portland, Oregon

Elementary School "Science Night" — *Nov 2014*
Volunteer, math booth coordinator

Relay for Life — *Mar 2013, Mar 2014*
Participant