

Harley Hanes | Curriculum Vitae

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Education

Degree Granting.....

Tulane University

M.S. in Computational Science 2019–2020

GPA: 4.0

Tulane University

B.S. in Mathematics 2015–2019

B.S.P.H. in Public Health

GPA: 3.8

Awards.....

Terry C. Lawson Prize in Mathematics

Tulane University School of Science and Engineering May 2019

Graduated Magna Cum Laude

Tulane University May 2019

Outstanding Research Presentation In Applied Mathematics

SACNAS Diversity in STEM Conference October 2018

Dean's List

Newcomb-Tulane College 2016–2019

Summer Programs.....

Industrial Math/Stat Modeling Workshop

Statistical and Applied Math Sciences Institute (SAMSI) July 2019

Research workshop where myself and a group of graduate students partnered with Pacific Northwest National Labs (PNNL) to solve an industry focused research question.

Mathematical and Theoretical Biology Institute (MTBI)

Arizona State University June–August 2018

Undergraduate Research Experience where I researched control of Lyme Disease transmission and received introductions to stochastic and deterministic modeling, relevant mathematical concepts, and programs and languages such as Matlab, R, Mathematica, Maple, and Python.

Critical Language Scholar

U.S. Department of State June–July 2016

The Critical Language Scholar program sends students studying State Department target languages to native countries for 8 weeks of language and culture immersion. I studied Arabic in Madaba, Jordan, lived with a Jordanian host family, and had 40 hours a week of Arabic instruction. My cohort could only speak Arabic for the duration of the program.

Employment

Research Assistant

Tulane University School of Public Health and Tropical Medicine August 2018–Present

I am responsible for conducting the math modeling and some statistical analysis for the Herrera and Dumonteil labs' projects. My primary responsibility is creating a mathematical model for the transmission of *T. cruzi*, the causative agent for Chagas Disease, between its sylvatic and domestic cycles in the New Orleans area and using this model to estimate human risk and identify areas for intervention to reduce infected vectors in homes. I also assist with writing the mathematical modeling component of an NIH R01 grant application.

Resident Advisor

Tulane University Housing and Residence Life

August 2017–May 2019

My responsibilities as a Resident Advisor in first year residence halls follow two main tracks of conduct enforcement and community building. I am on call approximately once a week to monitor and answer any issues in the dorm whether they be underage drinking or crises such as sexual assault or self-harm of residents. I also live in the dorm and am responsible for building a community among my floor's residents by supporting them through personal difficulties, advising them on academic and course related issues, and organizing events to help build community. I also act as a liaison between residents and Tulane faculty and staff running seminars or events.

Skills

Programming: Matlab, R, C++, HTML, JavaScript

Software: Linux, Latex, MPI, VTK, Paraview, d3

Research: Proposal and grant writing, project presentation, high performance computing, data visualization, computational analysis, constructing literature reviews, modeling biological systems.

Linguistic: Arabic (Intermediate-Advanced), German (Intermediate).

Interpersonal: Significant mentoring experience, strong teamwork and conflict mediation skills.

Research Projects

Thesis Project (Ongoing)

*'Sylvatic and Domestic *T. cruzi* Transmission Cycles and Chagas Disease Risk in New Orleans, Louisiana'*

My research on Chagas Disease focuses on building an ordinary differential equation host-vector model of the transmission of *T. cruzi* in the New Orleans area. I seek to use it first to take the limited data sampling for the New Orleans area to construct an estimation of the number of infected vectors in homes, which is where they almost exclusively infect humans. I will also use the model to identify optimal steps of the transmission pathway for intervention so that we can develop new ways for reducing human risk. I have also conducted literature reviews of human case data to estimate the risk for human infection in Louisiana.

MTBI Project (In Review)

'Modeling the Dynamics and Control of Lyme Disease in a Tick-Mouse System Subject to Vaccination of Mice Populations'

My research at MTBI used a difference equation model for the transmission of *B. burgdorferi*, the causative agent for Lyme Disease, between ticks and white-footed mice to capture the seasonality of the tick life-cycle and behavior. We then quantified the effectiveness of mice vaccination at various frequencies to determine frequencies required to reduce the number of infected ticks below certain thresholds. Finally, we conducted a cost analysis comparing the yearly cost of different vaccination levels and estimated health expenditures saved by case reduction.

Industrial Modeling Workshop with PNNL

A Machine Learning Approach for Solving AC Optimal Power Flows

My research group partnered with Pacific Northwest National Labs (PNNL) to use machine learning algorithms to solve the optimal power flow (OPF) problem during extreme deviations from base settings of a power grid. We generated data sets by perturbing IEEE's predefined 30-bus and 300-bus power flow system and trained neural networks and decision tree regression algorithms (XGBoost).

Greater New Orleans Area Breastfeeding Awareness Coalition (GNOBAC)

'Needs Assessment of Collaboration of Breastfeeding Organizations in New Orleans'

I partnered with GNOBAC and a group of Tulane undergraduates to survey non-profits and healthcare

providers that promote breastfeeding in the New Orleans area and identify barriers to collaboration between these organizations. This involved creating interview questions targeting certain hypotheses, contacting and interviewing leaders of non-profits or providers. We then transcribed and analyzed the interviews for the presence of certain themes that we used to build a framework for collaboration between non-profits and health care providers along.