Juliana C. Taube

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Education

Bowdoin College *Brunswick, ME*

A.B. *summa cum laude* WITH HONORS IN MATHEMATICS, MINOR IN BIOLOGY *2017 - 2021*

Undergraduate thesis: Modeling coupled disease-behavior dynamics of SARS-CoV-2 using influence networks

Advisors: Mary Lou Zeeman, PhD (Mathematics) and Mohammad Irfan, PhD (Computer Science, Digital & Computational Studies)

Relevant coursework: Linear Algebra, Probability, Statistics, Bayesian Statistics, ODEs, PDEs, Data Structures, Social & Economic Networks, Evolution, Ecology, Microbiology, Genetics & Molecular Biology, Science Communication

Research Experience

Georgetown University *Washington, D.C.*

RESEARCH ASSOCIATE, ADVISOR: SHWETA BANSAL, PHD *Aug. 2021 - present*

- Analyzed spatiotemporal trends in self-reported mask-wearing behavior (using Bayesian partial pooling models & survey raking)
- Mapping the immune landscape of smallpox at a fine spatial resolution using demographic and vaccination data
- Identifying spatiotemporal trends in self-reported non-household contacts (using GAMs)
- Characterizing network structure differences using proximity sensor data
- Reviewing gender, race, and ethnicity bias in citation practices within the field of infectious disease dynamics

Bowdoin College *Remote*

STUDENT RESEARCHER, ADVISORS: MARY LOU ZEEMAN, PHD; MOHAMMAD IRFAN, PHD *May 2021 - present*

- Continued honors thesis work in preparation for publication, specifically:
    - Adapted model to account for both global and local risk perception
    - Modified underlying network structure to better resemble real-world contact networks
    - Analyzed the role and interaction of risk perception and social influence terms in our model

Centers for Disease Control and Prevention, Division of Global Migration & Quarantine,
Office of Innovation, Development, Evaluation, and Analytics *Remote*

INTERN, ADVISORS: ARDATH GRILLS, PHD; SARAH BOWDEN, PHD; MICHAEL JOHANSSON, PHD *May - Aug. 2020*

- Gathered, cleaned, and wrangled census and meat-packing location data for COVID-19 hotspot model
- Used boosted regression tree machine learning model to predict and characterize COVID-19 county hotspots
- Collected data (attendance, venue size, event duration) for large gatherings considered COVID-19 superspreader events
- Looked for correlations between event aspects and disease transmission, in effort to estimate dispersion parameter
- Contributed to model implementation and assessment of interventions to mitigate COVID-19 spread on cruise ships

University of Georgia, Odum School of Ecology *Athens, GA*

STUDENT RESEARCHER (REU), ADVISORS: JOHN M. DRAKE, PHD; PAIGE B. MILLER, PHD *May - July 2019*

- Compiled and standardized infectious disease transmission trees from the literature into an R database
- Analyzed predictors of outbreak size & quantified the contribution of superspreading to onward transmission
- Tested theory relating frequency of superspreading events and the dispersion parameter

STUDENT RESEARCHER (REMOTE), ADVISORS: JOHN M. DRAKE, PHD; PAIGE B. MILLER, PHD *June - Dec. 2020*

- Expanded database to include COVID-19 transmission trees and released data online at outbreaktrees.ecology.uga.edu 🔗
- Further explored frequency, timing, and generation of superspreaders for COVID-19 relative to other diseases using database
- Findings were submitted for publication in PLoS Biology

Dartmouth Hitchcock Medical Center *Lebanon, NH*

INTERN, ADVISOR: PETER F. WRIGHT, MD *June - Aug. 2017*

- Assisted with development of Gates Foundation funding proposal: Applying the Lessons Learned from Polio Eradication
- Compiled and summarized literature on smallpox and polio eradication efforts, highlighting similarities and differences
- Organized data on bronchiolitis and RSV hospitalizations in New England

Publications

2. **Taube JC**, Miller PB, Drake JM (2022) An open-access database of infectious disease transmission trees to explore superspreader epidemiology. *PLoS Biology* 20(6): e3001685. %

1. Wright PF, Hoen AG, ..., **Taube JC**, Brickley EB (2022) Bronchiolitis hospitalizations in northern New England: Clues to disease prevention. *Therapeutic Advances in Infectious Disease* 9: 1-11. %

Presentations

Characterizing spatiotemporal trends in self-reported mask-wearing behavior in the U.S. *May 2022*
Delphi's COVID-19 Trends and Impacts Survey Monthly Collaboration Meeting, 15 minutes *Virtual*

Modeling coupled disease-behavior dynamics of SARS-CoV-2 using influence networks *Oct. 2021*
Invited talk for Prof. Mohammad Irfan's Research Group at Bowdoin College, 30 minutes *Virtual*

An open-access database of infectious disease transmission trees to explore superspreader epidemiology *May 2021*
Rapid Fire Talk at MIDAS Meeting 2021 *Virtual*

Who infected whom? Creating a database of transmission trees for comparative outbreak analysis *Dec. 2019*
Poster at Epidemics 7, also presented at University of Georgia's Final Summer REU Poster Session (July 2019) *Charleston, SC*
and Bowdoin College's President's Summer Research Symposium (October 2019)

Awards & Honors

2021 **Student Faculty Research Grant Fellowship**, summer research funding, Prof. Zeeman's NSF grant ($1920)
2020 **Almon Goodwin Prize**, awarded to exemplary members of Phi Beta Kappa
2020 **Phi Beta Kappa**
2020 **Sarah and James Bowdoin Scholar & Book Award Winner** (4x), Book Award is for students with 4.0 GPA
2020 **Bowdoin Funded Internship Grant**, for internship with CDC ($5000)
2019 **REU Travel Grant for Epidemics 7**, from Rocky Mountain Biological Laboratory ($2000)
2019 **Bowdoin College Goldwater Scholarship Nominee**
2018 **First Year Chemistry Award**, recognizes outstanding promise and achievement in chemistry
2017 **Bowdoin Faculty Scholar**, recognizes students who achieved excellence in their high school courses ($3000)
2017 **Bowdoin National Merit Scholarship** ($1000/yr)

Teaching Experience

Bowdoin College *Brunswick, ME*
MATHEMATICS TEACHING ASSISTANT *Feb. - May 2021*

- Partial Differential Equations (MATH 3209): created videos to explain homework solutions or review confusing concepts

DIGITAL AND COMPUTATIONAL STUDIES TEACHING ASSISTANT *Jan. - May 2021*

- Contagion (DCS 3350): curated resources and assisted students
- Searched for flight, mobility, population, and contact tracing data sources, summarized findings for student project
- Collected and organized news articles on racism, economic impacts, and misinformation during the COVID-19 pandemic
- Led weekly study group to help students with their coursework using networkx

COMPUTER SCIENCE TEACHING ASSISTANT *Jan. 2019 - Dec. 2020*

- Led weekly two-hour study groups to assist students with their assignments, including asking probing questions, finding the bugs in their code, and explaining concepts from class
    - Introduction to Computer Science (CSCI 1101): Jan. 2019 – Dec. 2020
    - Social and Economic Networks (CSCI/DCS 2350): Sept. – Dec. 2020

Service

Friends of the Mount Vernon Trail Volunteer
Feb. 2022 - present
Arlington, VA
- Participate about once a month in events to improve the Mount Vernon Trail for biking/walking/running, including trash pick-up, culvert digging, invasive honeysuckle removal, and trail widening

Bowdoin Curriculum Implementation Committee Alternate Member
Aug. 2020 - May 2021
Brunswick, ME
- Attended committee meetings to provide student perspective on course proposals, including how they fit into the Bowdoin curriculum, and whether they satisfied distribution requirements

Bowdoin Student-Athlete Advisory Committee Member
Aug. 2020 - May 2021
Brunswick, ME
- Representative from Bowdoin's Women's Varsity Ice Hockey Team, advocated for team needs and worked with college administration to implement NCAA and NESCAC initiatives

Training

Teaching, Learning & Innovation Summer Institute
Washington, DC
May 2022
GEORGETOWN UNIVERSITY
Workshops on universal design, assessments in STEM courses, use of office hours, and science communication

Summer Institute in Biostatistics
Minneapolis, MN
June - July 2018
UNIVERSITY OF MINNESOTA
Coursework: 6 weeks of classes in biostatistics, epidemiology, and statistical computing using R and SAS
Final project: Outlined clinical trial protocol of canakinumab in HIV+ patients

Skills

Programming   R, Python, Java, Mathematica
Software   LaTeX, Git, MacOS, Microsoft Office