

JUSTEN GEDDES

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EDUCATION

Doctor of Philosophy, Biomathematics

North Carolina State University, Raleigh, NC

Advisor: Mette S. Olufsen, Ph.D.

August 2018 - May 2023 (Expected)

Master of Science, Applied Mathematics

North Carolina State University, Raleigh, NC

GPA: 4.00/4.00

2020

Bachelor of Arts, Mathematics

State University of New York at Geneseo

Minor in Anthropology

Major GPA: 3.97/4.00, Overall GPA: 3.82/4.00

2018

RESEARCH INTERESTS

Mathematical biology, mathematical modeling, biomarkers, tensor decomposition, signal processing, and applications to physiology.

RESEARCH PUBLICATIONS

1. **Geddes, J.**, Ottesen J.T., Carlson, B., Olufsen, M. Multi-scale modeling of Postural Orthostatic Tachycardia Syndrome baroreflex system. In preparation.
2. **Geddes, J.**, Ottesen J.T., Mehlsen, J., Olufsen, M.S. Postural Orthostatic Tachycardia Syndrome explained using a Baroreflex response model. *Royal Society Open Interface*. 2022. DOI: 10.1098/rsif.2022.0220
3. Gilmore, S., Hart, J., **Geddes, J.**, Olsen, C.H., Mehlsen, J., Gremaud, P., Olufsen, M.S. Classification of orthostatic intolerance through data analytics. *Medical & Biological Engineering & Computing*. 2021 DOI: 10.1007/s11517-021-02314-0
4. **Geddes J.**, Einevoll, G., Acar, E., and Stasik, A. Multi-Linear Population Analysis (MLPA) of LFP data using Tensor Decompositions. *Frontiers in Applied Mathematics and Statistics*. 2020. DOI: 10.3389/fams.2020.00041
5. **Geddes, J.**, Mehlsen, J., and Olufsen, M.S. Classification of Oscillations in Blood Pressure and Heart Rate of Postural Orthostatic Tachycardia Syndrome Patients. *IEEE Transactions on Biomedical Engineering*. 2020. DOI: 10.1109/TBME.2020.2974095

GENERAL PUBLICATIONS

1. **Geddes, J.**, Olufsen, M.S. Signal Processing and Mechanistic Models Can Help Diagnose Postural Orthostatic Tachycardia Syndrome. *SIAM News Blog*. 2021

RESEARCH EXPERIENCE

North Carolina State University

Conducted research under Dr Mette Olufsen on the modeling of Postural Orthostatic Tachycardia Syndrome (POTS) and the analysis of patient data.

August 2018 - Present

Simula Summer School in Computational Physiology

June 2019 - August 2019

Chosen to participate in the Simula Summer School in Computational Physiology. Attended lectures and completed research that was later published.

Mathematics Department of Geneseo

August 2017 - May 2018

Conducted Mathematical research on Cancer Protein-Protein Interaction Networks under the supervision of Dr. Gregg Hartvigsen and Dr. Cesar Aguilar

TEACHING

- MA 111 - Precalculus Algebra and Trigonometry. Fall 2022. Instructor of Record
- MA 107 - Precalculus I. NC State. Spring 2022. Instructor of Record
- MA 103 - Topics in Contemporary Mathematics. NC State. Fall 2020. Instructor of Record (Online due to COVID-19)
- MA 523 - Linear Transformations and Matrix Theory. NC State. Spring 2021. Primary instructor

TEACHING ASSISTANT

- MA 340 - Modeling Biological Systems. SUNY Geneseo. Spring 2018.
- MA 222 - Calculus II. SUNY Geneseo. Spring 2018.
- New York State Emergency Medical Technician Class. Spring 2017-Spring 2018. Taught and oversaw practical skills portion of the course.

MENTORSHIP

Research Expeirience for Undergraduates (REU)

Mentored and supervised four undergraduate students while they did research on mathematical modeling the Valsalva maneuver during the summer of 2021 and 2022.

Graduate Students

Mentored one first year graduate student as part of the American Mathematical Society at NCSU's mentoring program.

Undergraduate Students

Mentored two undergraduate students through Undergrads Union Grads (UUG) program at NCSU. Assisted with course selection, graduate school applications and general academic concerns.

High School Students

Oversaw (Fall 2019 - Present) and supported a high school student's project to combine disease modeling and linear programming to optimize resource allocation during COVID-19 pandemic.

PRESENTATIONS

- "How Multiscale Modeling Can Help Us Understand POTS". SIAM Life Sciences 2022. Pittsburgh, PA.
- "Modeling the Cardiovascular Dynamics of Postural Orthostatic Tachycardia Syndrome". Biology and Medicine through Mathematics Conference. 2022.
- "Gaining insight into POTS using Mathematical Modeling and Signal Processing". NCSU Biomathematics Seminar 2021.
- "How Multi-Scale Modeling and Signal Processing Can Assist the Diagnosis of POTS". SIAM Annual Meeting 2021.
- "Cardiovascular regulation in POTS patients". Society for Mathematical Biology 2021.

- “Current Research in the Olufsen lab”. Presented to the Chancellor of North Carolina State University 2021.
- “Analysis of Time-Series Data for Diagnosis of POTS”. SIAM Life Sciences 2020.
- “Data Analysis and Mathematical Modeling of Postural Orthostatic Tachycardia Syndrome (POTS)”. Triangle Area Graduate Mathematics Conference 2020.

MINI-SYMPOSIA ORGANIZED

- Co-organizer (with Brian Carlson and Mette S. Olufsen) The Control of the Cardiovascular System in Health and Disease. Society for Mathematical Biology June 2021. Chaired session 2. Held virtually due to COVID-19 Pandemic.
- Co-organizer (with Amanda Colunga and Mette S. Olufsen) Analysis of physiological data. SIAM Life Sciences July 2020. Chaired session 1. Held virtually due to COVID-19 Pandemic.
- Chaired Contributed talk session 1 (CP1) - “Medicine” - at SIAM Life Sciences 2022, Pittsburgh, PA.

AWARDS AND HONORS

RTG Fellow

August 2019 - July 2020

Supported as a Research Assistant as part of the NCSU Research Training Group.

Provost Fellow

August 2018 - Present

Selected as an “Outstanding applicant for the Applied Mathematics Ph.D. program”

Supported as a Research Assistant through the NC State provost office

NSFGRFP Honorable Mention

Was given an honorable mention for application to the National Science Foundation Graduate Research Fellowship Program.

SUNY Chancellor’s Award for Student Excellence

1 of 3 Students chosen out of 4,500 in 2018 by SUNY Geneseo to receive the State University of New York’s highest honor. Given to students who “best show integration of academic excellence with other aspects of their lives, which may include leadership, campus involvement, athletics, career achievement, community service”.

Presidential Scholar

2017-2018 Presidential Scholar - 1 of 15 Seniors (only Scholar from Mathematics Department) chosen as exemplars of the Geneseo Student. Award given based on academic and extra-curricular merit.

SUNY Geneseo Math Department Award

Chosen as an exceptional undergraduate student of Mathematics at SUNY Geneseo

M.T. Sherman Memorial Scholarship

Received a scholarship of \$1,500 as a result of performance in SUNY Geneseo mathematics classes.

Pi Mu Epsilon

Inducted into the Pi Mu Epsilon Mathematics honor society spring 2017.

Phi Beta Kappa

Inducted into the Phi Beta Kappa honor society spring 2018.

2018 Geneseo Volunteer & Service Award

Awarded to a SUNY Geneseo student to recognize volunteer service and community contributions.

Certificate of Appreciation From Rockland County NY Assisted Rockland county with EMS response to the COVID-19 pandemic as a NYS EMT.

William T. and Dorothy Nowak Smith Dedicated Service Award

Recognized as a volunteer with exemplary service to the community.

OUTREACH

BUGG Elementary School

Presented as part of an outreach program for graduate students to talk to students at BUGG elementary school about their experiences with computational thinking. Delivered presentation and answered questions from students.

Boys & Girls Club's Youth of the Year

Participated in the Boys & Girls Club's Youth of the Year program as an advisor of a student. Assisted student in interview skills, writing a personal statement and a cover letter as well as various other aspects of the application for the program.

MEMBERSHIPS

Society of Industrial and Applied Mathematics
NCSU Cardiovascular Dynamics Group
Society of Industrial and Applied Mathematics (SIAM)
American Mathematical Society
Pi Mu Epsilon

GRADUATE LEVEL COURSES

Numerical Matrix Analysis I & II - Passed Qualifying Exam Summer 2019
Mathematical Modeling I & II - Passed Qualifying Exam Summer 2019
Biomathematics I: Dynamical systems
Biomathematics II: Stochastic modeling
Biomathematics III: Biological Partial Differential Equations
Manifold Theory I
Biostatistics
Mathematical Medical Physiology
Medical Imaging: Xray, CT, Nuclear
Modeling Infectious Diseases
Data-driven Modeling and Analysis
Introduction to Fluid Mechanics
Writing Science Effectively

TECHNICAL SKILLS

Computer Languages

MATLAB (Advanced)
R (Intermediate)
Python (Some experience)
Maple (Some experience)
C (Some experience)
Fortran (Some experience)

Software & Tools

LaTeX
Excel

ADDITIONAL EXPERIENCE

Society of Industrial and Applied Mathematics (SIAM)
President NCSU Student Chapter (May 2020 - May 2021)
Member (August 2018 - present)

As president: Oversaw NCSU SIAM student chapter - coordinated student officers, planned events such as job and recruiting talks, and generally maintained the chapter.

Geneseo First Response

March 2015 - May 2018

Chief of Operations (May 2017-May 2018)

Crew Chief (March 2016-May 2018)

Attendant (March 2015-February 2016)

Volunteer EMT-B

- As Chief Of Operations: Served as sole leader of agency. Held weekly meetings, conducted EMT evaluations, selected new members, trained perspective lead medics, and carried out the general responsibilities of leading 80 EMTs.
- As a Crew Chief (lead EMT): In charge of two other members of Geneseo First Response on scene. Tasked with treating and ensuring the well-being of patients on scene.
- As an attendant: Assisted crew chiefs with medical emergency calls on SUNY Geneseo campus as part of a First Response Emergency Medical Services agency.
- Attended the National Collegiate Emergency Medical Services Foundation Conference in 2016-2017 with six other members. Attended 30 lectures over the 2 annual sessions about various EMS topics.
- Volunteered approximately 2,200 hours

Cuylerville Fire Department

October 2016 - May 2018

Cleared Medic

Volunteer EMT-B

- Charged with treating and transporting patients with emergency medical conditions.
- Volunteered approximately 800 hours

Livingston County Training Center

January 2017 - May 2018

EMT-B Course Lab Instructor

- Taught and oversaw students practice the practical skills portion of the NYS EMT-B curriculum.