Weston Baines

Department of Mathematics Mailstop 3368
Texas A&M University College Station, Texas
bainesw1@tamu.edu
math.tamu.edu/~bainesw1

Education

Doctorate in Mathematics - In Progress Texas A&M University, College Station, Texas, *GPA: 3.9*, Adviser: Peter Kuchment, Distinguished Professor. Expected Date of Graduation: May 2022 "Inverse Problems Arising in Medical, LIDAR, and Homeland Security Imaging"

Bachelor's in Mathematics/Electrical Engineering State University of New York at New Paltz, New Paltz, New York, *GPA: 3.9*, Summa Cum Laude, Graduated May 2016

Experience

Academic

Graduate Research Assistant - Supported by NSF and Texas A&M Grants
Texas A&M University, College Station, Texas, August 2017 - Present
Conduct research in image science and inverse problems. Current focus on the application of deep learning to homeland security problems involving the detection of illicit special nuclear materials.

Undergraduate Student Researcher
State University of New York at New Paltz, New York, Summer 2015 - Summer 2016
Conducted research and design in wireless power transfer. Designed MATLAB software, measurement setups, and radio frequency circuits to communicate with an implantable sensor. Improved wireless communication range by 5x. Designed cavity backed antenna using 3-D printed substrate for improved gain and bandwidth. (See Publications)

Vocational

Physical Science Intern
Geospatial Research Laboratory, Alexandria, Virginia, June 2019 - Present
Conduct research in methods for coincidence processing in Geiger Mode Lidar Systems.

Engineering Intern
Sono-Tek, Milton, New York, Summer 2015
Built sub-assemblies for several specialty machines. Assisted in completing various projects. Conducted research on electromagnetic interference shielding as part of a collaborative research initiative between Sono-Tek and The State University of New York at New Paltz.

Skills

Programming: Python, Tensorflow/Keras, C/C++, MATLAB, CUDA C, LaTeX, Mathematica

Electrical Engineering Soldering, Printed Circuit Board (PCB) Design, Radio Frequency Design, Antenna Design, Vector Network Analyzer, Power Spectrum Analyzer, Oscilloscope, PCB Milling Machine

Research Interests

Inverse Problems, Image Science, Deep Learning, Mathematical Physics and Partial Differential Equations

Publications

W. Baines "The Range Description of a Conical Radon Transform" 2021 Submitted

C. Marchant, **W. Baines** "3D Kernel Regression for Coincidence Processing in Geiger-Mode Lidar" 2021 In Preparation

W. Baines, P. Kuchment, and J. Ragusa "Deep learning for 2D passive source detection in presence of complex cargo" 2020 *Inverse Problems* https://doi.org/10.1088%2F1361-6420%2Fabb51d

W. Baines and R. Dahle, "Enhanced bandwidth microstrip patch antennas through 3-D printing," 2016 IEEE International Symposium on Antennas and Propagation (APSURSI), Fajardo, Puerto Rico 2016, pp. 815-816.

Presentations

The Range Description of a Conical Radon Transform
SIAM TX-LA Annual Meeting 2021 - Mini-Symposium Mathematics and Computation in Biomedicine 11/06/2021

Deep learning for 2D passive source detection in presence of complex cargo
SIAM TX-LA Annual Meeting 2020 - Mini-Symposium Recent advances in inverse problems: Numerics, theory, and applications 10/18/2020

Deep Neural Network For Source Detection in 2D High Noise Emission Type Problems
BMS Summer School 2019 - Mathematics of Deep Learning, FU Berlin, Berlin, Germany, 08/19/2019-08/30/2019

Source Detection in 2D High Noise Emission Type Problems Using Cone Data
Gordon Research Conference in Image Science, Stonehill College, Massachusetts, 06/17/2018-06/22/2018
ICERM Workshop on Computational Imaging, Brown University, Providence, Rhode Island, 03/18/2019-03/22/2019

Enhanced bandwidth microstrip patch antennas through 3-D printing
AP-S/URSI 2016, Fajardo, Puerto Rico, 06/27/2016

Teaching

Teaching Assistant
MATH 609: Numerical Analysis, Texas A&M University, Fall 2021

Instructor
MATH 168: Finite Mathematics, Texas A&M University, Spring 2021

Instructor
Applied Analysis Qualifying Exam Preparation Course, Texas A&M University, Summer 2018

Mentor
Directed Reading Program, Texas A&M University, September 2018 - December 2019

Teaching Assistant
Help Session - Ordinary Differential Equations, Texas A&M University, Summer 2017

Leadership and Outreach

Organizer
Novel Medical Imaging Workshop Texas A&M University, November 22-23, 2019

Secretary
Society for Industrial and Applied Math, Graduate Student Chapter, Texas A&M University, September 2018 - June 2019

Mentor
Directed Reading Program, Texas A&M University, Fall 2018 - Fall 2019

Peer Mentor
AWM Graduate Peer Mentor Program, Texas A&M University, Fall 2018-Fall 2019

Recognitions

Certificate of Appreciation
Presented for exceptional work with the Geospatial Research Laboratory as an intern during Summer 2021

Certificate of Appreciation
Presented for exceptional work with the Geospatial Research Laboratory as an intern during Summer 2020

Certificate of Appreciation
Presented for exceptional work with the Geospatial Research Laboratory as an intern during Summer 2019

Certificate of Recognition
Awarded in recognition of outstanding efforts and accomplishments on behalf of the SIAM Chapter at Texas A&M University, May 2019

Outstanding Graduate in Mathematics/Electrical Engineering
May 2016

Gerson B. Robison Award
Awarded for academic excellence in Mathematics, May 2016

Steve Bogart Memorial Scholarship
Awarded for academic excellence in Engineering, May 2015

Dutchess Educators United Award in Mathematics
Awarded for academic excellence in Mathematics, May 2014

Richard Steffen Engineering Alumni Scholarship
Awarded for academic excellence in Engineering, May 2014

Conferences, Workshops and Specialized Training

Novel Medical Imaging Workshop - Organizer
Texas A&M University November 22-23, 2019

PhD Research Workshop in Computational/Artificial Intelligence
Texas A&M University, College Station, Texas, 09/17/2019-09/20/2019

BMS Summer School 2019 - Mathematics of Deep Learning
FU Berlin, Berlin, Germany, 08/19/2019-08/30/2019

ICERM Workshop on Computational Imaging
Brown University, Providence, Rhode Island, 03/18/2019-03/22/2019

Oberwolfach Seminar: Mathematics of Deep Learning
Mathematisches Forschungsinstitut Oberwolfach, Germany, 10/14/2018 - 10/20/2018

Creating Knowledge from Imaging Data
Gordon Research Conference in Image Science, Stonehill College, Massachusetts, 06/17/2018-06/22/2018

IEEE International Symposium on Antennas and Propagation
AP-S/URSI, Fajardo, Puerto Rico, 06/26/2016-07/01/2016

Professional Organizations

American Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)

Coursework

Real Variables I/II (MATH 607 / MATH 608)

Intro to Ordinary and Partial Differential Equations (MATH 611)

Analysis for Applications I (MATH 641)

Numerical Methods in Differential Equations (MATH 610)

Partial Differential Equations (MATH 612)

Graph Theory (MATH 613)

Topology I (MATH 636)

Finite Element Methods (MATH 661)

Differential Geometry I (MATH 622)

Distribution Theory and Fourier Analysis (MATH 685)

Analytical Mechanics (PHYS 601)

Complex Variables I/II (MATH 617 / MATH 618)

Applications of Deep Learning (MATH 689)

Theory of Probability I (MATH 606)

Applied Topology (MATH 664)

Topics in Mathematical Data Science (MATH 664)

High Dimensional Probability With Applications (MATH 689)

Topological Insulators I (MATH 664)