

Dr. Thomas Humphries

APPLIED AND COMPUTATIONAL MATHEMATICIAN | ASSOCIATE PROFESSOR

University of Washington Bothell, Box 358538, 18115 Campus Way NE, Bothell, WA 98011

☎ 425.352.3827 | ✉ thumphri@uw.edu | 🏠 faculty.washington.edu/thumphri/ | 📄 Scholar

Education

Simon Fraser University

Burnaby, British Columbia, Canada

Ph.D. APPLIED AND COMPUTATIONAL MATHEMATICS

2011

Thesis title: Temporal Regularization and Artifact Correction in Single Slow-Rotation Dynamic SPECT
Supervisors: Dr. Anna Celler, Dr. Manfred Trummer

Simon Fraser University

Burnaby, British Columbia, Canada

M.Sc. APPLIED AND COMPUTATIONAL MATHEMATICS

2007

Thesis title: Improved Numerical Integration for Analytical Photon Distribution Calculation in SPECT
Supervisors: Dr. Anna Celler, Dr. Manfred Trummer

University of Waterloo

Waterloo, Ontario, Canada

B.Math. JOINT HONOURS APPLIED MATHEMATICS & COMPUTER SCIENCE

2005

With Distinction – Dean's Honours List

Academic Experience

University of Washington Bothell

Bothell, WA, USA

ASSOCIATE PROFESSOR, DIVISION OF ENGINEERING AND MATHEMATICS, SCHOOL OF STEM

September 2022 – present

ASSISTANT PROFESSOR

October 2015 – August 2022

Oregon State University

Corvallis, OR, USA

POSTDOCTORAL SCHOLAR, DEPARTMENT OF MATHEMATICS

September 2013 – September 2015

Memorial University of Newfoundland

St. John's, NL, Canada

POSTDOCTORAL FELLOW, DEPARTMENT OF MATHEMATICS

August 2011 – August 2013

Vancouver General Hospital

Vancouver, BC, Canada

RESEARCH ASSISTANT/GRADUATE STUDENT, MEDICAL IMAGING RESEARCH GROUP

May 2005 – August 2011

University of Waterloo

Waterloo, ON, Canada

MATH PROGRAMMER, SYMBOLIC COMPUTATION GROUP

May – August 2004

Publications

* denotes undergraduate student co-author. † denotes graduate student co-author.

PEER REVIEWED

- 2022 M. Loreto, T. Humphries, C. Raghavan*, K. Wu* and S. Kwak*. A New Spectral Conjugate Subgradient Method with Application in Computed Tomography Image Reconstruction. *Applied Mathematics & Optimization*. Submitted.
- 2022 Y. Jia*, N. McMichael*, P. Mokarzel*, B. Thompson*, D. Si and T. Humphries. Superiorization-inspired unrolled SART algorithm with U-Net generated perturbations for sparse-view and limited-angle CT reconstruction.. *Physics in Medicine and Biology*. 67(24) 245004.
- 2020 T. Humphries and B. Wang*. Superiorized method for metal artifact reduction. *Medical Physics*. 47(9), 3984–3995.
- 2020 T. Humphries, M. Loreto, B. Halter*, W O'Keeffe* and L. Ramirez*. Comparison of regularized and superiorized methods for tomographic image reconstruction. *Journal of Applied and Numerical Optimization*. 2(1), 77–99.
- 2017 T. Humphries, J. Winn* and A. Faridani. Superiorized algorithm for reconstruction of CT images from sparse-view and limited-angle polyenergetic data. *Physics in Medicine and Biology*. 62(16), 6762–6783.

- 2015 T. Humphries. Technical Note: Convergence analysis of a polyenergetic SART algorithm. *Medical Physics*. 42(7), 4007–4014.
- 2015 T. Humphries and R. Haynes. Joint optimization of well placement and control for nonconventional well types. *Journal of Petroleum Science and Engineering*. 126, pp. 242–253.
- 2014 T. Humphries, R. Haynes and L. James. Simultaneous and sequential approaches to joint optimization of well placement and control. *Computational Geosciences*. 18(3-4), pp. 433–448.
- 2014 A. Butler*, R.D. Haynes, T.D. Humphries, P. Ranjan. Efficient Optimization of the Likelihood Function in Gaussian Process Modelling. *Computational Statistics & Data Analysis*. 73, pp. 40–52.
- 2012 T. Humphries, A. Celler and M. Trummer. Effects of attenuation in single slow rotation dynamic SPECT. *Physics in Medicine and Biology*. 57(14) pp. N253–N265.
- 2011 T. Humphries, A. Celler and M. Trummer. Slow-rotation dynamic SPECT with a temporal second-derivative constraint.. *Medical Physics*. 38(8), pp. 4489–4497.
- 2009 S. Shcherbinin, A. Celler, M. Trummer, and T. Humphries. An APD-based iterative reconstruction method for simultaneous technetium-99m/iodine-123 SPECT imaging. *Physica Medica: European Journal of Medical Physics*. 25(4), pp. 192–200.

UNPUBLISHED MANUSCRIPTS

- 2021 R. Xing[†], T. Humphries and D. Si. Self-Attention Generative Adversarial Network for Iterative Reconstruction of CT Images. *arxiv.org*. <https://arxiv.org/abs/2112.12810>.

CONFERENCE PROCEEDINGS

- 2020 Y. Jia*, N. McMichael*, P. Mokarzel*, D. Si and T. Humphries. Algorithm for limited angle CT reconstruction with U-net based regularization. *IEEE Medical Imaging Conference Record*. pp. 1–5.
- 2019 T. Humphries, D. Si, S. Coulter*, M. Simms* and R. Xing[†]. Comparison of deep learning approaches to low dose computed tomography using low intensity and sparse view data. *SPIE Medical Imaging*. pp. 1048 – 1054.
- 2017 T. Humphries, R. McGarity* and K. Uy*. Comparison of image and data domain methods for three-material decomposition in dual-energy CT. *IEEE Medical Imaging Conference Record*. pp. 1-4.
- 2017 T. Humphries and A. Gibali. Superiorized polyenergetic reconstruction algorithm for reduction of metal artifacts in CT images. *IEEE Medical Imaging Conference Record*. pp. 1-6.
- 2015 T. Humphries and A. Faridani. Reconstruction of CT Images from Sparse-View Polyenergetic Data Using Total Variation Minimization. *IEEE Medical Imaging Conference Record*. pp. 1-5.
- 2015 G.L.C. Carosio, T. D. Humphries, R.D. Haynes and C.G. Farquharson. A closer look at differential evolution for the optimal well placement problem. *Genetic and Evolutionary Computation Conference*. pp. 1191-1198.
- 2014 T. Humphries and A. Faridani. Segmentation-free quasi-Newton method for polyenergetic CT reconstruction. *IEEE Medical Imaging Conference Record*. pp. 1-5.
- 2012 T. Humphries, R. Haynes and L. James. Simultaneous optimization of well placement and control using a hybrid global-local strategy. *13th European Conference on the Mathematics of Oil Recovery*. cp-307-00040.
- 2011 T. Humphries, A. Celler and M. Trummer. Effects of attenuation in single slow rotation dynamic SPECT. *IEEE Medical Imaging Conference Record*. pp. 3725 – 3731.
- 2009 T. Humphries, A. Saad, A. Celler, G. Hamarneh, T. Möller, M. Trummer. Segmentation-Based Regularization of Dynamic SPECT Reconstruction. *IEEE Medical Imaging Conference Record*. pp. 2849–2852.
- 2007 T. Humphries, A. Celler and M.R. Trummer. Improved numerical integration for analytical photon distribution calculation in SPECT. *IEEE Medical Imaging Conference Record*. pp. 3548–54.
- 2006 S. Shcherbinin, A. Celler, M. Trummer, T. Humphries. An APD-based Iterative Reconstruction Method for Simultaneous Technetium-99m/Iodine-123 SPECT Imaging. *IEEE Medical Imaging Conference Record*. pp. 2058–2062.
- 2005 G. Labahn and T. Humphries. Symbolic Integration of Jacobi Elliptic Functions in Maple. *Maple Conference*. pp. 1–8.

OTHER

- 2022 T. Humphries. After Two Years, a Reunion in the Pacific Northwest. *SIAM News*. May Issue.

Grants

FUNDED

2019-2020 Deep Learning for Computed Tomography Image Reconstruction (with Dong Si) (\$32,676). *Royalty Research Fellowship*. This grant allowed us to purchase a state-of-the-art workstation and hire two UWB students, Noah McMichael and Mingjia Cai, to work as full-time research assistants for eight weeks during the Summer.

UNFUNDED

2018 A Mathematical Modeling App for Teachers (with Rejoice Akapame) (\$99,845). *MISK Grand Challenges*. This grant proposed to develop an app to help mathematics teachers foster 21st century skills in their students, through development of culturally-relevant mathematical modeling problems.

2017 Superiorized iterative method for tomographic reconstruction (\$24,048). *Royalty Research Fellowship*. This grant application proposed to develop a novel method for reconstruction of computed tomography (CT) images from polyenergetic data, using the superiorization methodology.

Awards

2015-16 ASSOCIATED STUDENTS OF UW BOTHELL OUTSTANDING FACULTY AWARD

Awarded to an advisor, faculty, or staff member who has made a significant impact in the lives of students by: providing a significant amount of support and encouragement to students and student organizations; creating a stable environment (within their classroom, office, etc.) where students may excel and grow as individuals; and demonstrating a commitment to the well-being of students and the community.

Presentations

PROFESSIONAL CONFERENCES

2022 Unrolled algorithm for sparse-view and limited-angle tomography (Oral). *3rd Biennial Meeting of SIAM Pacific Northwest Section*. Vancouver, WA, USA.

2021 Plug-and-play superiorization for CT image reconstruction (Oral). *SIAM Conference on Optimization*. Virtual.

2020 Unrolled iterative algorithm for CT reconstruction with learned penalty term (Oral). *Canadian Mathematical Society Winter Meeting*. Virtual.

2020 Algorithm for limited angle CT reconstruction with U-Net based regularization (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference*. Virtual.

2019 Deep learning approaches for improving computed tomography image quality (Oral). *2nd Biennial Meeting of SIAM Pacific Northwest Section*. Seattle, WA, USA.

2019 Applications of Deep Learning to Computed Tomography Image Reconstruction (Oral). *Canadian Applied and Industrial Mathematics Society Annual Meeting*. Whistler, BC, Canada.

2019 Comparison of deep learning approaches to low dose CT using low intensity and sparse view data (Poster). *SPIE Medical Imaging: Physics of Medical Imaging*. San Diego, CA, USA.

2017 Comparison of image and data domain methods for three-material decomposition in dual-energy CT (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. Atlanta, GA, USA.

2017 Superiorized polyenergetic reconstruction algorithm for reduction of metal artifacts in CT images (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. Atlanta, GA, USA.

2015 Reconstruction of CT images from sparse-view polyenergetic data using total variation minimization (Oral). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. San Diego, CA, USA.

2014 Segmentation-free quasi-Newton method for polyenergetic CT reconstruction (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. Seattle, WA, USA.

- 2013 Simultaneous and Sequential Approaches to Optimizing Well Placement and Control (Oral). *Optimization Days/OPDE*. Montreal, QC, Canada.
- 2012 Simultaneous Optimization of Well Placement and Control Using a Hybrid Global-local Strategy (Oral). *ECMOR XIII-13th European Conference on the Mathematics of Oil Recovery*. Biarritz, France.
- 2012 Simultaneous Optimization of Well Placement and Control Using a Hybrid Global-local Strategy (Oral). *Canadian Applied and Industrial Mathematics Society Annual Meeting*. Toronto, ON, Canada.
- 2011 Integrated 4D Reconstruction of Dynamic Data for Myocardial Blood Flow Measurements with Dedicated SPECT Cameras (Oral). *Joint AAPM/COMP Meeting*. Vancouver, BC, Canada.
- 2010 Slow-rotation dynamic SPECT with a temporal second-derivative constraint. (Poster). *Canadian Mathematical Society Winter Meeting*. Vancouver, BC, Canada.
- 2009 Segmentation-Based Regularization of Dynamic SPECT Reconstruction (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. Orlando, FL, USA.
- 2009 Dynamic SPECT Imaging of Kidneys (Poster). *Society of Nuclear Medicine AGM*. Toronto, ON, Canada.
- 2007 Improved numerical integration for analytical photon distribution calculation in SPECT (Poster). *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*. Honolulu, HI, USA.
- 2005 Symbolic Integration of Jacobi Elliptic Functions in Maple (Oral). *Maple Conference*. Waterloo, ON, Canada.

OTHER MEETINGS AND SEMINARS

- 2021 Plug-and-play superiorization for CT image reconstruction (Oral). *Mathematics Colloquium*. University of Idaho.
- 2020 Iterative Reconstruction of Sparse View and Limited Angle CT Data with Learned Penalty Terms (Oral). *Cascade RAIN meeting*. Virtual.
- 2019 Applications of Deep Learning to CT imaging (Oral). *Cascade RAIN Meeting*. Bothell, WA, USA.
- 2019 Deep Learning approaches to Low-Dose CT (Oral). *Imaging Research Lab Seminar*. University of Washington.
- 2017 Superiorized algorithm for reduction of metal artifacts in CT (Oral). *Cascade RAIN Meeting*. Vancouver, BC, Canada.
- 2017 Using math to see inside the body (Oral). *UW Bothell Admitted Students Day*. University of Washington Bothell.
- 2016 Reconstruction of CT Images from Sparse-View Polyenergetic Data Using Total Variation Minimization (Oral). *Imaging Research Lab Seminar*. University of Washington.
- 2015 Reconstruction of polyenergetic CT data from sparse-view projection data (Oral). *Applied Math and Computation Seminar*. Oregon State University.
- 2014 Reconstruction of polyenergetic CT data from a small number of projections (Oral). *Centre for Scientific Computing Seminar*. Simon Fraser University.
- 2014 Approaches for joint optimization of oil well placement and control (Oral). *Applied Math and Computation Seminar*. Oregon State University.
- 2013 Reconstruction of dynamic SPECT images from slow-rotation data (Oral). *Math Department Colloquium*. Oregon State University.
- 2013 Simulation and Optimization (Oral). *Blundon Seminar*. Memorial University of Newfoundland.
- 2013 Simultaneous optimization of well placement and control using a hybrid global-local strategy (Oral). *Computational and Applied Mathematics Seminar*. Memorial University of Newfoundland.
- 2012 Temporal regularization and artifact correction in single slow-rotation dynamic SPECT (Oral). *Computational and Applied Mathematics Seminar*. Memorial University of Newfoundland.
- 2008 Reconstruction of dynamic images in SPECT (Oral). *Math Grad Student Union Seminar*. Simon Fraser University.
- 2007 The mathematics of SPECT imaging (Oral). *Applied Math Graduate Student Conference*. Simon Fraser University.

PRESENTATIONS BY MENTORED STUDENTS

- 2020 Yiran Jia. CNN-Based Iterative Image Reconstruction Techniques (Oral). *University of Washington Undergraduate Research Symposium*. Virtual.
- 2020 Yiran Jia. CNN-Based Iterative Image Reconstruction Techniques (Oral). *Data Science and Image Analysis Conference of the Pacific Northwest*. Washington State University, Pullman, WA.
- 2019 Noah McMichael and Pedro Mokarzel. Iterative method for computed tomography reconstruction with learned regularization term (Poster / short oral). *2nd Biennial Meeting of SIAM Pacific Northwest Section*. Seattle, WA.
- 2019 Nodira Povey. Applying U-Net model to improve the quality of low dose and sparse-view CT scans (Poster). *2nd Biennial Meeting of SIAM Pacific Northwest Section*. Seattle, WA.
- 2018 Brad Halter. Applying Spectral Projected Gradient and Simulated Annealing Optimization for CT Image Reconstruction (Oral). *11th Annual Northwest Undergraduate Mathematics Symposium*. Willamette University, Salem, OR.
- 2018 Luis Ramirez. Applying Spectral Projected Gradient and Simulated Annealing Optimization for CT Image Reconstruction (Oral). *14th Annual UNC Greensboro Regional Mathematics and Statistics Conference*. UNC Greensboro, NC.
- 2018 Brad Halter, William O’Keeffe, and Luis Ramirez. Applying Spectral Projected Gradient and Simulated Annealing Optimization for CT Image Reconstruction. (Poster). *University of Washington Summer STEM Research Poster Session*. University of Washington, Seattle.
- 2017 Ryan McGarity and Kevin Uy. Multi-Material Decomposition for Dual-Energy Computed Tomography (Poster). *UW Bothell Undergraduate Research and Creative Practice Symposium*. University of Washington, Bothell.
- 2017 Jason Winn. Superiorized Algorithm for Reconstruction of CT Images from Sparse-View and Limited-Angle Polyenergetic Data (Poster). *University of Washington Undergraduate Research Symposium*. University of Washington, Seattle.
- 2017 Zachery Viray. Multi-material Decomposition for Dual Energy Computed Tomography (Oral). *Gulf States Math Alliance Conference*. University of Texas, Arlington.
- 2017 Amanda Alexander, Zachery Viray and Derek Thurmer. Multi-material Decomposition for Dual Energy Computed Tomography (Poster). *Joint Mathematics Meeting*. Atlanta, Georgia.

Mentorship

AT UW BOTHELL (2015 – PRESENT)

Graduate Students

2020–22 RAHIL MEHTA

Rahil was an MSCSSE student co-supervised by myself and Dong Si. He successfully defended his masters project, *CT Metal Artifact Reduction using Unpaired Image-to-Image Translation*, in March 2022.

2018–20 RUIWEN XING

Ruiwen was an MSCSSE student co-supervised by myself and Dong Si. He successfully defended his masters thesis, *Deep Learning based CT Image Reconstruction*, in March 2020.

Undergraduate Students – Research

2022 MICHAEL LEVENKOV

Michael worked on contributions to the LEAN theorem prover by encoding proofs of results related to Hermite interpolation and Chebyshev polynomials in the LEAN programming language.

2021 JON HENSHAW

Jon worked with me on a project related to developing a plug-and-play approach to superiorized image reconstruction, specifically by incorporating the BM3D denoising method into reconstruction of low-dose CT images.

- 2021 KAYA PENG & REBECCA LEE
Kaya started a project on applying reinforcement learning to superiorized reconstruction of sparse-view CT images, using techniques similar to those used in training neural networks to play video games. This work was continued by Rebecca after Kaya graduated.
- 2021 SHUTAO ZHANG
Shutao worked with me on a project comparing superiorization with some well-established regularization techniques.
- 2020-21 BRADFORD HALTER
Dr. Milagros Loreto and I worked with Brad to incorporate a Gaussian Process model-base search into the GLODS (Global and Local Optimization using Direct Search) algorithm.
- 2020 BRANDON THOMPSON
Brandon worked on adapting a previously proposed method for learned gradient descent to our CT dataset for the purposes of comparing against our unrolled algorithm. This required modifying the data input pipeline of the method and fine-tuning the network parameters.
- 2019-20 YIRAN JIA
Yiran continued the work of Noah and Pedro by investigating the effect of network architecture on the performance of the unrolled CT reconstruction algorithm. She found that by using an architecture based on the U-Net, we could obtain better results in limited-angle CT imaging. She presented her work at a regional mathematics meeting and also at the UW Undergraduate Research Symposium. She also co-authored a poster/conference record paper for the 2020 IEEE Medical Imaging Conference, and an article submitted to *Physics in Medicine and Biology*.
- 2019 NODIRA POVEY
Nodira studied the effectiveness of the U-Net as a post-processing method for low-dose and sparse-view CT, comparing it against the earlier work of Sean and Matthew. She presented her work at the poster session of the 2019 SIAM Biennial Meeting.
- 2019 NOAH MCMICHAEL & PEDRO MOKARZEL
Noah and Pedro worked on adapting a method for unrolling an iterative reconstruction algorithm for CT imaging into a deep neural network. They implemented a previously proposed method from scratch in Python and then studied some modifications to the underlying iterative algorithm. They presented their work at the poster session of the 2019 SIAM Biennial Meeting, and their work contributed to an article submitted to *Physics in Medicine and Biology*.
- 2019 MINGJIA CAI
Mingjia worked on adapting a general method for solving underdetermined linear inverse problems using deep learning to the problem of sparse-view and limited-angle CT reconstruction. The method is based on training a neural network to act as a projection operation onto the space of “natural images.”
- 2019 SHU-MIN HOU
Shu-Min worked on applying deep learning in the context of TV-regularized low dose CT reconstruction. In particular, he investigated whether an appropriate value of the regularization parameter could be determined directly from the sinogram data.
- 2018-19 BOYANG (JESSIE) WANG
Jessie worked with me on methods for metal artifact reduction in CT imaging. She was able to implement several existing methods from the literature which we then used in implementing a new approach. Her work contributed to a paper in *Medical Physics*.

- 2018 BRADFORD HALTER, WILL O'KEEFFE, & LUIS RAMIREZ
 Brad, Will and Luis worked with me during the 2018 NREUP program at UWB. We worked on adapting a method for regularized image deblurring using the spectral projected gradient method to CT image reconstruction using total variation. Their work contributed to a paper in the *Journal of Applied and Numerical Optimization*. They also presented their work at the UW Summer STEM Research Poster session, while Brad and Luis made presentations at regional undergraduate mathematics meetings.
- 2018 SEAN COULTER & MATTHEW SIMMS
 Sean and Matt worked on studying the effectiveness of using a neural network as a pre- or post-processing step for sparse-view and low-dose CT. Their work contributed to a poster presentation at the 2019 SPIE Medical Imaging Conference.
- 2017 RYAN MCGARITY & KEVIN UY
 Ryan and Kevin continued the work of the 2016 REU group on multi-material decomposition in the data domain, by analyzing sensitivity to noise, choice of materials, and beam spectrum, and the use of iterative reconstruction techniques to improve image quality. Their work contributed to a poster presentation at the 2017 IEEE Medical Imaging Conference.
- 2016 AMANDA ALEXANDER, DEREK THURMER, & ZACHERY VIRAY
 Amanda, Derek and Zachery worked with me during the 2016 UW Bothell REU. They implemented several methods for multi-material decomposition in CT imaging and developed a new method based on decomposition in the data domain. They presented their work at the student poster session of the 2017 Joint Mathematical Meetings
- 2016 JASON WINN
 Jason worked on incorporating an anisotropic total variation (ATV) method into a superiorized approach for limited-angle polyenergetic CT reconstruction. His work contributed to a paper published in *Physics in Medicine and Biology*. He also presented his work at the UW Undergraduate Research Symposium.

Undergraduate Students – Independent Study

- 2022 JIACHENG LU
 Jiacheng was interested in learning more about methods for solving PDEs to prepare for graduate studies in mathematics. We covered most of the material from an engineering textbook by Farlow covering methods for parabolic, hyperbolic, and elliptic PDEs.
- 2020 HOWARD OH
 Howard was a physics major / math minor who wanted to follow up on material he had taken in his Mathematical Physics class. We covered material from the second half of his textbook, including solution of PDEs using Fourier Series, and series solutions to ODEs.
- 2018–19 AVERINA ITA
 Averina was hired as an intern at a small local software development company and needed to do independent study for course credit. Her work involved designing APIs for product schedule searching, which interfaced with a SQL database. Averina submitted a report to me at the end of each quarter describing her work, with particular focus on mathematical content.
- 2016 HEEKWON CHOI
 Prior to its creation as a regular course, Heekwon did an independent study of Numerical Analysis II with me. He had taken Numerical Analysis I as a special topics class in Winter 2016, and was interested in following up on the second half of the material.

AT MEMORIAL UNIVERSITY (2011–2013)

Undergraduate Students – Research

2012-13 ANDREW BUTLER

I co-supervised Andrew on his Honours Undergraduate thesis together with my postdoctoral supervisor, Ron Haynes. Andrew investigated improving the efficiency of methods for solving the likelihood optimization problem associated with fitting Gaussian Process models. His work resulted in a paper published in *Computational Statistics & Data Analysis*.

Teaching

AT UW BOTHELL (2015 – PRESENT)

Courses Taught

- BMATH 122 – Precalculus I
- STMATH 124 – Calculus I
- STMATH 125 – Calculus II
- STMATH 300 – Foundations of Mathematics
- STMATH 208/308 – Matrix Algebra and Applications (renumbered to 208 in 2022)
- STMATH 405 – Numerical Analysis I
- STMATH 406 – Numerical Analysis II
- STMATH 407 – Linear Programming
- STMATH 408 – Nonlinear Optimization
- STMATH 424 – Real Analysis I
- STMATH 493 – Special Topics, Introduction to Numerical Analysis
- STMATH 498 – Independent Study
- STMATH 499 – Undergraduate Research

Chronology of Teaching Assignments

* denotes a new preparation. Number in brackets indicates number of sections taught.

2022-23 STMATH 124 (1), STMATH 300 (2), STMATH 405 (2)
2021-22 BMATH 122* (1), STMATH 208 (1), STMATH 405 (2), STMATH 406(1), STMATH 407 (1), STMATH 498*
2020-21 STMATH 125 (3), STMATH 407* (2), STMATH 408 (1), STMATH 424* (1), STMATH 498* (1)
2019-20 STMATH 125 (1), STMATH 300 (2), STMATH 405 (2)
2018-19 STMATH 125* (2), STMATH 405 (2), STMATH 408 (1)
2017-18 STMATH 124* (1), STMATH 300 (2), STMATH 405 (1), STMATH 406* (1)
2016-17 STMATH 300 (2), STMATH 308 (1), STMATH 405 (1), STMATH 408* (1)
2015-16 STMATH 308* (4), STMATH 493* (1), STMATH 498*

Courses Developed

2016 STMATH 405 – NUMERICAL ANALYSIS I

Methods and theory for numerically solving systems of equations, both linear and nonlinear. Topics include numerical error, stability and conditioning, root finding, direct and iterative methods for linear systems, linear least squares, eigenvalue problems, and nonlinear systems.

2016 STMATH 406 – NUMERICAL ANALYSIS II

Methods and theory for numerically approximating functions, their integrals and derivatives, and solutions to ODEs. Topics include polynomial and piecewise polynomial interpolation, the Fourier transform, numerical differentiation and integration, and approximate solution of ODEs using Euler and Runge-Kutta methods.

AT OREGON STATE UNIVERSITY (2013 – 2105)

Courses Taught

- MTH 256 – Applied Differential Equations
- MTH 306 – Matrix and Power Series Methods
- MTH 341 – Linear Algebra I
- MTH 351 – Introduction to Numerical Analysis

AT MEMORIAL UNIVERSITY (2011 – 2013)

Courses Taught

- Math 2000 – Calculus III

AT SIMON FRASER UNIVERSITY (2005–2011)

- Teaching assistant for calculus, mathematical modeling, and numerical analysis
- Completed Instructional Skills Workshop (2010) and Certificate in University Teaching and Learning (2011)

Service

AT UW BOTHELL (2015 – PRESENT)

University service

2020–2023 UW FACULTY COUNCIL ON RESEARCH

The FCR is the advisory body to the UW Faculty Senate on university policy relating to research. In my time on the FCR, I have participated in monthly meetings and been part of the subcommittee reviewing and making recommendations on classified, proprietary and otherwise restricted research.

School / division service

2022–23 MATHEMATICS WORKING GROUP ON DIVERSITY, EQUITY AND INCLUSION

Fall 2022.

2022– SCHOOL OF STEM COUNCIL FOR DIVERSITY, EQUITY AND INCLUSION

Fall 2022.

2022– E & M COMMITTEE ON DIVERSITY, EQUITY AND INCLUSION

Fall 2022.

2022 E & M PROMOTION SUBCOMMITTEE

Served on committee to review application for faculty promotion to Associate Teaching Professor.

2022 MATHEMATICS WORKING GROUP ON MATHEMATICS CULTURE STATEMENT

Part of working group to draft a culture statement for the mathematics faculty at UWB that is inclusive of all types of mathematicians in the faculty, and in line with the School STEM's policy and value statements regarding promotion of tenure and teaching track faculty.

2022 MATHEMATICS WORKING GROUP ON SUPPORTING SCIENCES REQUIREMENT

Chaired working group to examine the role of supporting science (physics) courses required for the math degree, and to make a recommendation on whether those requirements should be modified.

2022 PART-TIME AND ANNUALLY APPOINTED PERSONNEL COMMITTEE FOR MERIT REVIEW

Reviewed annual activity reports submitted by part-time teaching faculty in E & M, and prepared recommendations on reappointments and merit reports.

2020– MATHEMATICS PETITION COMMITTEE

Reviewed requests from students for course equivalency (e.g. for courses transferred from another institution), as well as petitions to waive degree requirements in special cases

2018–19 E&M WORTHINGTON FUNDS REVIEW COMMITTEE

Reviewed and ranked applications for Worthington Fund requests (internal funds for research equipment, awarded annually), and made a recommendation to the division chair. I chaired the committee in 2019.

2016– FACULTY ADVISOR FOR UWB MATHEMATICS SOCIETY

The UWB Mathematics Society is a student organization whose goal is to promote interest and awareness of mathematics opportunities within the campus community, through the use of lectures, social gatherings, outings, and other events. As faculty advisor, I meet regularly with club officers to provide support in planning and running math society events.

2016–2020 CONTENT MANAGEMENT FOR MATHEMATICS PROGRAM WEBSITE

Responsible for occasionally updating the program information on the Mathematics website, and attending training for the content management system used by UW.

- 2016–18 LECTURER PERSONNEL COMMITTEE FOR MERIT REVIEW
Responsible for reviewing annual activity reports submitted by full and part-time Lecturers in E & M, and preparing merit and progress-to-promotion reports. I chaired the committee in 2016 and 2017.
- 2016 HIRING COMMITTEE (LECTURER OR SENIOR LECTURER IN MATHEMATICS)
Reviewed applications, contributed to determining a shortlist for phone and in-person interviews, and preparing a recommendation for the hiring decision.

PROFESSIONAL/VOLUNTEER SERVICE

- 2023 MINISYMPOSIUM CO-ORGANIZER
Co-organizer of minisymposium on Advances in Optimization and Feasibility Methods for and with Machine Learning, SIAM Conference on Optimization
- 2022 THEMATIC SESSION ORGANIZER
Organizer of Thematic Session on Imaging Science, Third Biennial SIAM PNWS Meeting.
- 2022 CO-CHAIR
Co-chair of Third Biennial SIAM PNWS meeting, which took place in Vancouver, WA, May 20-22, 2022.
- 2021-22 GUEST EDITOR
Guest editor for Special Issue on Projection and Splitting Methods and Their Applications, *Journal of Applied and Numerical Optimization*, 2022.
- 2021 GRANT REVIEW PANEL
Reviewed grants for NSF Division of Mathematical Sciences, and participated in panel discussion and ranking.
- 2020 CO-ORGANIZER
Pacific Northwest Numerical Analysis Seminar (PNWNAS), Virtual Meeting
- 2020– SECRETARY, SIAM PACIFIC NORTHWEST SECTION
Responsible for maintaining communication with members at PNW institutions, planning and promoting events, and maintaining the section website.
- 2019 THEMATIC SESSION ORGANIZER
Organizer of Thematic Session on Inverse Problems in Imaging, Second Biennial SIAM PNWS Meeting.
- 2019 CO-ORGANIZER
Cascade Regional Applied and Interdisciplinary Numerics (RAIN) meeting, UW Bothell
- 2014 VOLUNTEER
Cascade Computational and Applied Mathematics Seminar, Oregon State University
- 2014 VOLUNTEER
Oregon Invitational Math Tournament, Oregon State University
- 2013 VOLUNTEER
Blundon High School Mathematics Contest, Memorial University
- 2007–09 CO-ORGANIZER
Applied Math Graduate Student Conference, Simon Fraser University

PEER REVIEW

- Last three years:
 - Biomedical Imaging Express
 - Computers in Biology and Medicine
 - IEEE Access
 - IEEE Transactions on Medical Imaging
 - Inverse Problems
 - Journal of Applied and Numerical Optimization
 - Journal of Electronic Imaging
 - Medical & Biological Engineering and Computing
 - Medical Physics
 - Numerical Algorithms
 - Nondestructive Testing and Evaluation
 - Quantitative Imaging in Medicine and Surgery
 - The Visual Computer
- Earlier:
 - Computational Geosciences
 - Journal of Petroleum Science and Engineering
 - SPE Journal

Professional Memberships

Society for Industrial and Applied Mathematics (SIAM), 2016–present.

Skills

Programming Languages Python, Matlab, C/C++, Java, Maple
Spoken Languages English, French