curriculum vitae
matthias chung

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Research interests

numerical analysis & scientific computing, inverse problems, computational biology, applied linear algebra, machine learning, parameter estimation, dynamical systems, optimization

Education

2002 – 2006	Dr. rer. nat. in Mathematics (Ph.D. equivalent) at the University of Lübeck, Germany *Summa Cum Laude*
1995 – 2001	Studies of Mathematics with a minor in Computer Science at the University of Hamburg, Germany with a Diploma (Dipl. math.) (German equivalent of M. Sc. degree)
1999 – 2000	Exchange-student (Erasmus program) at the School of Mathematics and Computer Science, University of Leicester (UK)

Employment

2019 – 2021	Humboldt Follow, Department of Mathematics, TU Berlin
since 2018	Associate Professor, Department of Mathematics, Virginia Tech
2012 – 2018	Assistant Professor, Department of Mathematics, Virginia Tech
2010 – 2012	Assistant Professor, Department of Mathematics, Texas State University – San Marcos
2008 – 2010	Post Doctoral Research Fellow, Computational and Life Sciences Strategic Initiative and Department of Mathematics and Computer Science, Emory University
2002 – 2008	Research assistant, third-party funds project, Institute of Mathematics, University of Lübeck, Germany
2001 – 2002	Research assistant, third-party funds project, Department of Computer Science, University of Hamburg, Germany

Funded research projects

● **Externally funded research projects**

[G8] Project Title: *Sublimantary NSF grant for I/UCRC CASERM*
Source of Support: *NSF*
Award Amount: *$150,000 incremental funding to award [G6]*
List of PIs: *Erik Westman, John Chermak, John Hole, Matthias Chung*
Support Period: *06/23/2021–08/31/2023*

[G7] Project Title: *Alexander von Humboldt Senior Research Fellowship*
Source of Support: *Alexander von Humboldt Foundation*
Award Amount: *12 month of research support*
List of PIs: *Matthias Chung*
Support Period: *08/01/2019–07/31/2020*

[G6] Project Title: *Phase I I/UCRC Virginia Tech: Center for Advanced Subsurface Earth Resource Models (CASERM)*
Source of Support: *NSF IIP 1822108*
Award Amount: *$750,000 at Virginia Tech, $1,500,000 total plus approx. $300,000 annual membership fees from companies and agencies*
List of PIs: *Matthias Chung (Site Director till 2019), John Chermak, John Hole, Erik Westman (Site Director since 2020)*
Support Period: *09/01/2018–08/31/2023*

[G5] Project Title: *Stochastic Approximations for the Solution and Uncertainty Analysis of Data-Intensive Inverse Problems*
Source of Support: *NSF DMS 1723005 (Collaborative Research: CDS&E-MSS)*
Award Amount: *$210,000 at Virginia Tech, $400,000 total*
List of PIs: *Matthias Chung, Julianne Chung (VT); Youssef Marzouk (MIT); Luis Tenorio (Mines)*
Support Period: *09/01/2017–08/31/2020*

[G4] Project Title: *Quantifying Nitrogen Transformations and Loses Associated with Manure Storage to Improve Accuracy of Whole Farm Process Based Nitrogen Accounting Models*
Source of Support: *USDA NIFA: 2016-08687*
Award Amount: *$475,000*
List of PIs: *Jactone Ogejo, Matthias Chung, Biswarup Mukhopadhyay (VT)*
Support Period: *01/01/2017–12/31/2019*

[G3] Project Title: *Virginia Tech Planning Grant: I/UCRC for Advanced Subsurface Earth Resource Models*
Source of Support: *NSF I/UCRC 1650463*
Award Amount: *$15,000*
List of PIs: *Matthias Chung, John Hole, Erik Westman (VT)*
Support Period: *02/01/2017–01/31/2018*
Note: *This is a seed grant for establishing an industry sponsored center on subsurface modeling and targeted towards the mining industry. I am the lead PI at VT.*

[G2] Project Title: *Identifying the dynamics of small and large microbial communities*
Source of Support: *NIH R21 GM107683-01*
Award Amount: *$313,067*
List of PIs: *Matthias Chung (VT); Mihai Pop (UMD)*
Support Period: *09/15/2013–08/31/2016*

[G1] Project Title: *Energy Metabolism: Physiology and Model, Graduate School for Computing in Medicine and Life Sciences*
Source of Support: *German Research Association (DFG)*
Award Amount: *€45,000 (approx. $63,000)*
List of PIs: *Matthias Chung (Emory); Kerstin Oltmanns (U Lübeck)*
Support Period: *09/01/2007–01/01/2012*

- Internally funded research projects

[H5] Project Title: *Precision Feeding & Performance Diagnostic System For Dairy Cattle*
Source of Support: *CALS Strategic Plan Advancement, College of Agriculture and Life Sciences, Virginia Tech*
Award Amount: *$ 36,080*
List of PIs: *Mark Hanigan, Matthias Chung, Wu Feng, Rebecca Cockrum, Gota Morota*
Support Period: *08/01/2021–07/31/2022*

[H4] Project Title: *Least squares finite element methods for ODEs*
Source of Support: *Hamlett Undergraduate Research, Virginia Tech Foundation*
Award Amount: *$ 2,000*
List of PIs: *Matthias Chung, Honghu Liu*
Support Period: *01/01/2020–06/30/2021*

[H3] Project Title: *Gaussian Process in Reduced Order Models*
Source of Support: *Hamlett Undergraduate Research, Virginia Tech Foundation*
Award Amount: *$ 2,000*
List of PIs: *Matthias Chung*
Support Period: *06/01/2018–12/31/2018*

[H2] Project Title: *HPC Methods for Randomized Least-Squares Problems*
Source of Support: *Hamlett Undergraduate Research, Virginia Tech Foundation*
Award Amount: *$ 3,000*
List of PIs: *Matthias Chung*
Support Period: *01/01/2018–05/31/2018*

[H1] Project Title: *Optimal Experimental Design with Model Constraints*
Source of Support: *Internal Texas State University Research Enhancement Grant*
Award Amount: *$ 8,000*
List of PIs: *Matthias Chung (TxState)*
Support Period: *09/01/2011–08/31/2012*

Awards & recognitions

2019/2021 Alexander von Humboldt Fellowship for Experience Researchers.

2011/2012 Research Excellence Award from the Department of Mathematics at Texas State University, 2011. Nominee for the Presidential Award of Excellence in Research, 2011/2012.

Publications

- Journal papers (submitted & in revision)

[U3] J. Chung, M. Chung, S. Gazzola, M. Pasha. Efficient learning methods for large-scale optimal inversion design. *arXiv preprint*, `https://arxiv.org/abs/2110.02720`, 2021.

[U2] M. Chung, J. Krueger, H. Liu. Least-Squares Finite Element Method for Ordinary Differential Equations. *arXiv preprint*, `https://arxiv.org/abs/2109.15133`, 2021.

[U1] E. Newman, J. Chung, M. Chung, L. Ruthotto. slimTrain–A Stochastic Approximation Method for Training Separable Deep Neural Networks. *arXiv preprint*, `https://arxiv.org/abs/2109.14002`, 2021.

- **Journal papers**

[J28] B.M. Afkham, J. Chung, M. Chung. Learning Regularization Parameters of Inverse Problems via Deep Neural Networks. *Inverse Problems*, 37(10), 105017, 2021.

[J27] J. Chung, *M. Chung*, J. T. Slagel, and L. Tenorio. Sampled Limited Memory Methods for Massive Linear Inverse Problems. *Inverse Problems*, 36(5), 2020.

[J26] S. Karunarathne, *M. Chung*, and J. A. Ogejo. Compartmental process-based model for estimating ammonia emissions from stored liquid dairy manure. SN Applied Sciences, 2(4), 2020.

[J25] J. T. Slagel, J. Chung, M. Chung, D. Kozak, and L. Tenorio. Sampled Tikhonov Regularization for Large Linear Inverse Problems. *Inverse Problems*, `https://doi.org/10.1088/1361-6420/ab2787`, 2019.

[J24] M. Chung, M. Binois, R.B. Gramacy, J. Bardsley, D.J. Moquin, A.P. Smith, and A.M. Smith. Parameter and uncertainty estimation for dynamical systems using surrogate stochastic processes. *SIAM Journal on Scientific Computing*, 41(4), A2212–A2238, 2019.

[J23] L. Ruthotto, J. Chung, *M. Chung*. Optimal Experimental Design for Constrained Inverse Problems. *SIAM Journal on Scientific Computing*, 40(4): B1080–B1100, 2018.

[J22] Q. Mu, V. Tavella, J. Kirby, T. Cecere, *M. Chung*, J. Lee, S. Li, S. Ahmed, C. Reilly, and X. Luo. Antibiotics ameliorate Lupus-like symptoms in mice. *Scientific Reports*, 7(1):13675, 2017.

[J21] *M. Chung*, J. Krueger, and M. Pop. Robust parameter estimation for biological systems: A study on the dynamics of microbial communities. *Mathematical Bioscience*, 294:71–84, 2017.

[J20] A.C. Rodriguez, *M. Chung*, and S.M. Ciupe. Understanding the complex patterns observed during hepatitis B Virus therapy. *Viruses*, 9(117):1–15, 2017.

[J19] J. Chung and *M. Chung*. Optimal regularized inverse matrices for inverse problems. *SIAM Journal on Matrix Analysis and Applications*, 38(2):458–477, 2017.

[J18] Y. Zhao, *M. Chung*, B.A. Johnson, C.S. Moreno, and Q. Long. Hierarchical feature selection incorporating known and novel biological information: Identifying genomic features related to prostate cancer recurrence. *Journal of the American Statistical Association*, 111(516):1427–1439, 2016.

[J17] J. Chung, *M. Chung*, and D.P. O'Leary. Optimal regularized low rank inverse approximation. *Linear Algebra and its Applications*, 468:260–269, 2015.

[J16] J. Chung and *M. Chung*. An efficient approach for computing optimal low-rank regularized inverse matrices. *Inverse Problems*, 30(11): 1–19, 2014.

[J15] B. Göbel, K.M. Oltmanns, and *M. Chung*. Linking neuronal activity to the glucose metabolism. *Theoretical Biology and Medical Modelling*, 10(50), 1–19, 2013.

[J14] *M. Chung*, B.A. Johnson and Q. Long. A tutorial on rank-based coefficient estimation for censored data in small- and large-scale problems. *Statistics and Computing*, 1–14, 2013.

[J13] E. Haber, *M. Chung*, and F. Hermann. An effective method for parameter estimation with PDE constraints with multiple right hand sides. *SIAM Journal on Optimization*, 22(3), 739–757, 2012.

[J12] J. Chung, *M. Chung*, and D.P. O'Leary. Optimal filters from calibration data for image deconvolution. *Journal of Mathematical Imaging and Vision*, 44(3), 336–374, 2012.

[J11] *M. Chung* and E. Haber. Experimental design for biological systems. *SIAM Journal on Control and Optimization*, 50(1):471–489, 2012.

[J10] B. Göbel, *M. Chung*, K.M. Oltmanns, A. Peters, and D. Langemann. Robust modeling of appetite regulation. *Journal of Theoretical Biology*, 291:65–75, 2011.

[J9] J. Chung and *M. Chung* and D. P. O'Leary. Designing optimal spectral filters for inverse problems. *SIAM Journal on Scientific Computing*, 33(6):3132-3152, 2011.

[J8] *M. Chung*, B. Göbel, A. Peters, K. M. Oltmanns, and A. Moser. Mathematical model of the biphasic dopaminergic response to glucose. *Journal of Biomedical Science and Engineering*, 4:136–145, 2011.

[J7] Q. Long, *M. Chung*, C. S. Moreno, and B.A. Johnson. Risk prediction for prostate cancer recurrence through regularized estimation with simultaneous adjustment for nonlinear clinical effects. *Annals of Applied Statistics*, 5(3):2003–2023, 2011.

[J6] B.A. Johnson, Q. Long, and *M. Chung*. On path restoration for censored outcomes. *Biometrics*, 67, 2011.

[J5] B. Göbel, D. Langemann, K. M. Oltmanns, and *M. Chung*. Compact energy metabolism model: Brain controlled energy supply. *Journal of Theoretical Biology*, 264(4):1214–24, 2010.

[J4] *M. Conrad*, C. Hubold, B. Fischer, and A. Peters. Modeling the hypothalamus-pituitary-adrenal system: Homeostasis by interacting positive and negative feedback. *Journal of Biological Physics*, 35:149–162, 2009.

[J3] L. Ramrath, J. Levering, *M. Conrad*, A. Thuemen, H. Fuellgraf, and A. Moser. Mathematical identification of a neuronal network consisting of GABA and dopamine in striatal slices of the rat brain. *Computational and Mathematical Methods in Medicine*, 10(4):273–285, 2009.

[J2] A. Peters, *M. Conrad*, C. Hubold, U. Schweiger, B. Fischer, and H. L. Fehm. The principle of homeostasis in the hypothalamus-pituitary-adrenal system: new insight from positive feedback. *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology*, 293(1):R83–R98, 2007.

[J1] A. Peters, U. Schweiger, L. Pellerin, C. Hubold, K. M. Oltmanns, *M. Conrad*, B. Schultes, J. Born, and H. L. Fehm. The selfish brain: Competition for energy resources. *Neuroscience & Biobehavioral Reviews*, 28(2):143–180, 2004.

● Book chapters

[B2] *M. Chung* and B. Göbel. *Advances in Systems Biology*, chapter Mathematical modeling of the energy metabolism based on the Selfish Brain Theory, pages 425–440, Springer, New York, 2012.

[B1] *M. Conrad* and J. Prestin. *Tutorials on Multiresolution in Geometric Modelling*, chapter Multiresolution on the sphere, pages 165–202. Springer, New York, 2002.

● Proceeding papers

[P7] R. A. Genedy; J. Ogejo; M. Chung. Predicting liquid dairy manure temperature during storage using machine learning and finite element analysis tools. *2021 Annual International Meeting*, `doi:10.13031/aim.202100278`, 2021.

[P6] J. Chung, *M. Chung*, and J. T. Slagel.   Iterative Sampled Methods for Massive and Separable Nonlinear Inverse Problems. *Proceedings of Seventh International Conference on Scale Space and Variational Methods in Computer Vision*, 119–130, Springer, 2019.

[P5] S. Karunarathne, *M. Chung*, and J. A. Ogejo.   Compartmental process-based model for estimating ammonia emission from liquid dairy manure storage tank. Proceedings of the *2017 ASABE Annual International Meeting*, 2017.

[P4] B. Y. Lee, A. Moustakas, A. Zeigler, M. Prague, R. Santos, *M. Chung*, R. Gras, V. Forbes, S. Borg, et al.. Population modelling by examples II. Society for Computer Simulation International, *Proceedings of the Summer Computer Simulation Conference*, 2016.

[P3] J. Chung and *M. Chung*.   Computing optimal low-rank matrix approximations for image processing. *IEEE Proceedings of the Asilomar Conference on Signals, Systems, and Computers*. November 3-6, 2013, Pacific Grove, CA, USA, 2013.

[P2] S. McClellan, M. Casey, and *M. Chung*.   Coherent pre-distortion of low-frequency PLC carriers. *Conference Proceedings CTRQ 2013, The Sixth International Conference on Communication Theory, Reliability, and Quality of Service*, 2013.

[P1] J. Olesch, N. Papenberg, T. Lange, *M. Conrad*, and B. Fischer.   Matching CT and ultrasound data of the liver by landmark constrained image registration. *Proceedings of SPIE* (7261) 1: 72610G, 2009.

- Advised research

[O12] A. Krinos and A Maurais (Sponsor: M. Chung). Parameter and Uncertainty Estimation for a Model of Atmospheric CO_2 Observations. *SIAM Undergraduate Research Online*, 12, DOI 10.1137/18S017533, 2019.

- Technical reports

[O11] J. Chung, *M. Chung*, J. T. Slagel, and L. Tenorio. Stochastic Newton and Quasi-Newton methods for large linear least-squares problems, arXiv preprint `http://arxiv.org/abs/1702.07367`, 2017.

[O10] E. Haber and *M. Chung*. Simultaneous source for non-uniform data variance and missing data. arXiv preprint `http://arxiv.org/abs/1404.5254`, 2014.

[O9] *M. Conrad* and B.A. Johnson A quasi-Newton algorithm for efficient computation of Gehan estimates. *Technical Report, Emory University, Department of Biostatistics and Bioinformatics*, TR-2010-02, 2010.

[O8] *M. Conrad* and N. Papenberg.   Iterative adaptive Simpson and Lobatto quadrature in Matlab. *Technical Report, Emory University, Department of Mathematics and Computer Science* TR-2008-012, 2008.

- Abstracts

[O7] Y. Tian, Y. Zhou, J. Chung and *M. Chung*. A Bayesian approach to linear inverse problems in seismic tomography. *Proceedings of the AGU Fall Meeting* (abstract), 2014.

[O6] *M. Chung* and S. Ciupe.   Parameter identifiability in virus infection models: an application to hepatitis B (extended abstract). *Proceedings of International Symposium of Bioinformatics Research and Applications*, Charlotte, USA, 2013.

[O5] *M. Conrad*, C. Hubold, B. Fischer, U. Schweiger, H. L. Fehm, and A. Peters. The "principle of balance": How do biological systems become homeostatic? (abstract). *Experimental and Clinical Endocrinology & Diabetes*, 114:469, 2006.

[O4] *M. Conrad*. Multiresolution on the sphere (abstract). In Konstantinos Daniilidis, Reinhard Klette, and Ales Leonardis, editors, *Imaging Beyond the Pin-hole Camera. 12th Seminar on Theoretical Foundations of Computer Vision*, number 04251 in *Dagstuhl Seminar Proceedings*. Internationales Begegnungs- und Forschungszentrum (IBFI), Schloss Dagstuhl, Germany, 2005.

[O3] *M. Conrad*, C. Hubold, B. Fischer, U. Schweiger, H. L. Fehm, and A. Peters. The principle of regulation (abstract). *Experimental and Clinical Endocrinology & Diabetes*, 113:490, 2005.

[O2] H. Krüger, C. Hubold, *M. Conrad*, A. Peters, and H. L. Fehm. Responses of the LHPA-system to CRH stimulation in subjects with type 1 diabetes mellitus and obesity (abstract). *Experimental and Clinical Endocrinology & Diabetes*, 113:495–496, 2005.

[O1] *M. Conrad*, C. Hubold, B. Fischer, and A. Peters. The selfish brain: A new model of the LHPA-system (abstract). *Experimental and Clinical Endocrinology & Diabetes*, 112:481–482, 2004.

- ## Master (Dipl. Math.) & Ph.D. thesis (Dr. rer. nat.)

[T2] *M. Conrad*. Modellierung und Parameterschätzung endokriner Systeme. *English: Modeling and parameter estimation of endocrine systems*. PhD thesis, Institute of Mathematics, University of Lübeck, 2006.
Committee: B. Fischer (advisor), University of Lübeck; A. Peters, University of Lübeck; K. Voigt, Philipps-University Marburg

[T1] *M. Conrad*. Approximation und Multiskalenzerlegung auf der Sphäre. *English: Approximation and multiresolution analysis on the sphere*. Master thesis, Institute of Mathematics, University of Hamburg, 2001.
Committee: C. Geiger (advisor), University of Hamburg; G. Opfer, University of Hamburg

Presentations, invited talks & lectures

- ## Invited colloquia and seminar talks

October 2021	*Learning Regularization Parameters of Inverse Problems via Deep Neural Networks, CUQI Seminar, Technical University Denmark, Copenhagen, Denmark*
September 2021	*Modern Challenges in Inverse Problems, Mechanical Engineering Seminar, University of Michigan, Ann Arbor, USA*
July 2021	*Modern Challenges in Inverse Problems, LANS Seminar, Argonne National Lab, USA*
January 2020	*Challenges in Dynamical Systems Inference: New Approaches for Parameter and Uncertainty Estimation, Seminar, University of Potsdam, Germany*
December 2019	*Sampled Limited Memory Optimization Methods for Massive Least Squares Problems, Colloquium, Technical University Berlin, Berlin, Germany*
October 2019	*Sampled Limited Memory Methods for Least Squares Problems with Massive Data, Seminar, Technical University Denmark, Copenhagen, Denmark*

October 2019	*From Parameter Estimation to Optimal Experimental Design: Challenges in Biological Dynamical Systems Inference, Seminar, University of Bonn, Bonn, Germany*
March 2019	*Computational Challenges in Inverse Problems, Seminar, Auburn University, Auburn, USA*
May 2018	*Computational Challenges in Inverse Problems, Mathematisches Colloquium, Bergische Universität Wuppertal, Wuppertal, Germany*
March 2018	*Computational Challenges in Inverse Problems, Mathematics seminar, University of Montana, Missoula, USA*
February 2018	*Computational Challenges in Inverse Problems, ICES seminar, University of Texas, Austin, USA*
April 2015	*Designing Optimal Spectral Filters and Low-Rank Matrices for Inverse Problems, AEROASTRO seminar, MIT, Boston, USA*
October 2014	*Designing Optimal Spectral Filters and Low-Rank Matrices for Inverse Problems, Applied Mathematics and Statistics Colloquium, Colorado School of Mines, Golden, USA*
March 2014	*Designing Optimal Regularized Inverse Matrices for Inverse Problems, Biostatistics & Bioinformatics Seminar, Emory University, Atlanta, USA*
February 2014	*Lecture on Mathematical Modeling, Texas State University, San Marcos, USA*
January 2014	*Designing Optimal Spectral Filters and Low-Rank Matrices for Inverse Problems, Special Linear Algebra and Optimization Seminar, Stanford, USA*
March 2012	*Designing Optimal Experiments for Biological Systems, Colloquium of the Department of Mathematics, University of Texas at Arlington, USA*
February 2012	*Optimal Experimental Design in Biology and Medicine, Mathematical Sciences Colloquium, Michigan Tech, USA*
January 2012	*Optimal Experimental Design in Biology and Medicine, Mathematics Seminar, University of California, Merced, USA*
December 2011	*Experimental Design in Biology, Mathematics Seminar, North Dakota State University, USA*
October 2011	*Optimal Experimental Design in Biology, Applied Mathematics Seminar, University of Texas at Arlington, USA*
May 2011	*Optimal experimental design in biology and medicine, Graduate School for Computing in Medicine and Life Science, Colloquium, University of Lübeck, Germany*
March 2011	*Optimal experimental design for biological systems, Center for Bioinformatics and Computational Biology, University of Maryland, College Park, USA*
March 2011	*Optimal experimental design in biology and medicine, Department of Mathematics, Colloquium, Georgia State University, Atlanta, USA*
November 2010	*Optimal experimental design and its applications, ICES Seminar, UT Austin, USA*
May 2010	*Experimental design for biological systems, Department of Mathematics, University of Maryland, College Park, USA*
March 2010	*Experimental design for biological systems, Department of Mathematics, Texas State University, San Marcos, USA*
November 2009	*Optimal experimental design and parameter estimation for the energy metabolism, UBC Mathematical Biology Seminar, Vancouver, Canada*

September 2008	*Parameter estimation in ordinary differential equations, Laboratory for Biological System Analysis, Georgia Tech, Atlanta, USA*
December 2007	*The selfish brain: modeling and parameter estimation, Institute of Scientific Computing (IWR), Heidelberg, Germany*
December 2006	*Modeling the stress system, Institut für Physiologie und Pathophysiologie, Neurodynamik, Marburg, Germany*

- Invited lectures, conference, workshops, and minisymposia talks

August 2021	*Big Data Inverse Problems, Modeling and Optimization: Theory and Applications 2021, Lehigh University, USA*
July 2021	*Learning Optimal Priors, 16th U.S. National Congress on Computational Mechanics 2021*
May 2021	*Learning Regularization Parameters of Inverse Problems via Deep Neural Networks, SAMSI, North, USA*
April 2021	*Big Data Inverse Problems, East Coast Optimization Meeting 2021, George Mason University, USA*
March 2021	*Surrogate Data Inference, SIAM CSE, USA*
November 2019	*From Parameter Estimation to Optimal Experimental Design: Challenges in Biological Dynamical Systems Inference, Income 2019, Berlin, Germany*
February 2019	*Optimal Experimental Design: Sampling Methods for Massive Linear Inverse Problems, SIAM CSE, Spokane, USA*
November 2018	*From Parameter Estimation to Optimal Experimental Design: Challenges in Biological Dynamical Systems Inference, Workshop, Banff, Canada*
June 2018	*Randomized Newton methods for large least-squares problems, SIAM Imaging Science, Bologna, Italy*
May 2018	*Optimal Experimental Design for Constrained Inverse Problems, 9th International Conference on Inverse Problems: Modeling and Simulation, Malta*
April 2018	*Randomized Newton methods for large least-squares problems, SIAM Uncertainty Quantification, Garden Grove, USA*
June 2017	*Optimal Regularized Inverse Matrices for Inverse Problems, Householder Symposium XX, Blacksburg, USA*
March 2017	*Optimal Regularized Inverse Matrices for Inverse Problems, SIAM CSE, Atlanta, USA*
January 2017	*Stochastic Newton and Quasi-Newton Methods, SAMSI Workshop on Statistical Inverse Problems, Research Triangle Park, USA*
June 2016	*Optimal Regularized Inverse Matrices for Inverse Problems, Inverse Problem Symposium, Lexington, VA, USA*
April 2016	*Optimal Regularized Inverse Matrices for Inverse Problems, SIAM Uncertainty Quantification, Lausanne, CHE*
October 2015	*Optimal Low-Rank Inverse Preconditioner, SIAM Applied Linear Algebra, Atlanta, USA*
June 2015	*Lecture: Optimal Experimental Design for Differential Equations, IMA Uncertainty Quantification Workshop , Minneapolis, USA*
May 2015	*Optimal Inversion Matrices for Inverse Problems, Applied Inverse Problems Conference, Helsinki, Finland*

March 2015	*Optimal Inversion Matrices for Inverse Problems, AMS Sectional Meeting, Georgetown, USA*
August 2014	*Inverse Problems in Biological Systems, SIAM Life Science, Charlotte, USA*
May 2014	*Designing Optimal Regularized Inverse Matrices for Inverse Problems, SIAM Optimization, San Diego, USA*
May 2014	*Designing Optimal Regularized Inverse Matrices for Inverse Problems, SIAM Imaging Science, Hong Kong, China*
March 2014	*Designing Experiments for Optimal Parameter Recovery in Biological Systems, SIAM Uncertainty Quantification, Savannah, USA*
September 2013	*Designing Optimal Regularized Inverse Matrices for Inverse Problems, IFIP TC 7 2013, Klagenfurt, Austria*
May 2012	*Designing Optimal Spectral Filters for Inverse Problems, SIAM Imaging Science Conference, Philadelphia, USA*
September 2011	*Designing Optimal Spectral Filters for Inverse Problems, Workshop on Mathematical Methods for Medical Imaging, Vancouver, Canada*
June 2011	*Experimental Design in Biological Applications, ICIAM 2011, Vancouver, Canada*
June 2011	*Designing Optimal Spectral Filters for Inverse Problems, Workshop on Optimization and Machine Learning, University of Texas, Austin, USA*
July 2010	*Control mechanisms and modeling of the energy metabolism, SIAM Life Science 2010, Pittsburgh, USA*
August 2009	*Optimal experimental design for the surveillance of the glucose metabolism, ISMP, Chicago, USA*
July 2009	*Homeostasis by interacting positive and negative feedback, SMB Annual Meeting, Vancouver, Canada*
July 2009	*Optimal control in glucose regulation, SIAM Conference on Control and its Applications, Denver, USA*
September 2008	*Workshop on mathematical modeling of human metabolism and body weight regulation, Bethesda, Maryland, USA*
September 2007	*The selfish brain: homeostasis in physiological modeling, PhysCon, Potsdam, Germany*
June 2007	*Modeling the Hypothalamus-Pituitary-Adrenal system: homeostasis by interacting positive and negative feedback, Workshop From Complex Systems Theory to Clinical Neurology, Dresden, Germany*
October 2006	*Brain-enforced glucose homeostasis, 10th Annual Meeting of the Neuroendocrinology Section of the German Society of Endocrinology, Tübingen, Germany*
August 2006	*The "principle of balance" – How do biological systems become homeostatic?, Hormones & Brain, from cloning to clinic. 37th ISPNE Annual Meeting, Leiden, Netherlands*
February 2006	*Modeling the HPA system, The Selfish Brain Conference, Lübeck, Germany*
January 2006	*Modellierungsmethoden in der Selfish Brain Theorie, English: Methods for modeling elements of the Selfish Brain theory, Mathematical Modeling and Data Analysis in Biological Systems, Workshop, Lübeck, Germany*

August 2005	*Mathematik und Medizin: von Parabiose über Synergie zur Symbiose?, English: Mathematics and medicine: from parabiosis via synergy to symbiosis, Summer school of the German National Merit Foundation, Salem, Germany*
July 2005	*The Selfish Brain: A new model of the LHPA system, XXV. Dynamics Days Europe, Berlin, Germany*
July 2005	*The Selfish Brain: A new model of the stress system, Conference ECMTB05, Dresden, Germany*
June 2004	*Multiresolution on the sphere, Workshop on Imaging Beyond the Pinhole Camera, Dagstuhl, Germany*

● Other presentation and talks

2018–present	*Performing undergraduate research*, CMDA, Math at Virginia Tech
November 2018	*From Democracy to Dictatorship: German's path in the early 1930s*, Honor Residential College at Virginia Tech
November 2018	*Ethical Considerations in Mathematical Modeling and Data Analytics*, CMDA at Virginia Tech

Professional service

● Memberships

SIAM	*Society for Industrial and Applied Mathematics* Activity groups: SIAG on Computational Science and Engineering, SIAG on Imaging Science, SIAG on Linear Algebra, and SIAG on Uncertainty Quantification
Math Alliance	Math Alliance Mentor for underrepresented or underserved American student in a mathematical or statistical science

● Scientific community

2021–present	Guest Editor for Special Issue on "Big Data Inverse Problems", IOP Journal on Inverse Problems

● Organized conferences, workshops, & summer schools

April 2021	Covid-19 postpodend and reapplied *Big Data Inverse Problems, BIRS, Canada for 2023*
November 2018	*I/UCRC CASERM meeting, Golden, USA* Industry Advisory Board meeting of Center
June 2017	*Householder Symposium XX, Blacksburg, USA* Local organizing committee
January 2006	*Mathematical Modeling and Data Analysis in Biological Systems, Workshop, Lübeck, Germany*
August 2005	*The Selfish-Brain: Competition for Energy Resources, Summer school of the German National Academic Foundation, Salem, Germany*

● Organized minisymposia

March 2021	Advances in Sampling Methods and Prior Models for Large-Scale Bayesian Inverse Problems, 2 sessions, 8 speaker, SIAM Imaging Science, (virtual)
June 2018	Computational Methods for Large-Scale Machine Learning in Imaging, 2 sessions, 8 speaker, SIAM Imaging Science, Bologna, Italy

March 2017	*Inverse problems meet big data, 3 session, 12 speaker, SIAM CSE, Atlanta, USA*
April 2016	*Inverse problems meet big data, 1 session, 4 speaker, SIAM Uncertainty Quantification, Lausanne, CHE*
August 2015	*Computational learning and model optimization, 1 session, 4 speaker, ICIAM 2015, Beijing, China*
August 2014	*Parameter Estimation for Biological Systems, 1 session, 4 speaker, SIAM Life Science, Charlotte, USA*
August 2014	*Applications of Dynamical Systems to Biology and Medicine, 1 session, 4 speaker, SIAM Life Science, Charlotte, USA*
May 2012	*Inverse Problems and Statistical Learning in Imaging Applications, 1 session, 4 speaker, SIAM Imaging Science, Philadelphia, USA*
July 2011	*Experimental Design and its Applications, 1 session, 4 speaker, ICIAM, Vancouver, Canada*
July 2010	*Control mechanism of the energy metabolism, 2 session, 8 speaker, SIAM Life Science, Minisymposium, Pittsburgh, USA*
July 2010	*Optimal Experimental Design and its Applications, 1 session, 4 speaker, SIAM Annual, Minisymposium, Pittsburgh, USA*
July 2009	*Control and Inverse Problems in Medicine, 1 session, 4 speaker, SIAM Conference on Control and its Applications, Minisymposium, Denver, USA*

- **Program committees**

2021	Bioinformatics 2021, February 11-13, (virtual).
2020	Biotechno 2020, May 24–29, Venice, Italy.
2020	Bioinformatics 2020, February 24-26, Valetta, Malta.
2019	Biotechno 2019, June 2-6, Athens, Greek.
2016	Biocomputation 2016, June 26-30, Lisbon, Portugal, 2016.
2015	Biocomputation 2015, May 24–29, Rome, Italy, 2015.
2013	3nd IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) 2013, New Orleans, Louisiana, USA.
2012	2nd IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS) 2012, Las Vegas, Nevada, USA

- **Referee for journals and proceedings**

Journal of Machine Learning Research

Chronobiology International

Computational and Mathematical Methods in Medicine

Computational Statistics & Data Analysis

IEEE ICCABS 2012 and 2013 Proceedings

IET Systems Biology

Journal of Computational and Applied Mathematics

Journal of Mathematical Biosciences

Journal of Mathematical Imaging and Vision

Journal of Theoretical Biology

Mathematical Bioscience

Optimization and Engineering Journal

SIAM Journal of Scientific Computing

SIAM Journal of Matrix Analysis and Applications

SIAM Journal on Uncertainty Quantification

IEEE Decision and Control

BIT Numerical Mathematics

Numerische Mathematik

- **Referee for presentations**

2016,2017	Poster and presentation judge at Virginia Tech's Graduate Research Symposium
2011	Poster judge at Louis Stokes Alliance for Minority Participation (LSAMP) Summer Research Academy (SRA) conference at University of Texas at Arlington

- **University service**

2021–present	SIAM Student Chapter Advisor
2018–present	Senior Fellow of the Honor Residential College at Virginia Tech
2012–present	Graduate Certificate in International Research Committee (OIRED)

- **College service**

2012–present	Development of the Computational Modeling and Data Analytics (CMDA) major, established in 2016. I am a member of the early group designing this new successful degree program, with about 500 majors.

- **Departmental service**

2021–present	Undergraduate advising (Math traditional option)
2020–present	Graduate Program Committee (Academic Coordinator)
2020–present	Undergraduate advising (Traditional Option)
2020–present	Undergraduate Research Coordinator
2018–present	Graduate program committee
2015–present	Departmental teaching evaluation
2018–2020	Instructor personal committee
2015–2020	Mathematical Biology Prelim committee
2013–2020	ACM Undergraduate advising
2014–2018	Colloquium committee (chair)
2014–2015	Matrix computation seminar (chair)
2012–2014	Colloquium committee
2012–2013	Inverse problem seminar (chair)
2021	Developed Graduate course MATH 5544 *Mathematical Optimization for Machine Learning*

- **Search committees**

2021–present	Search committee (chair) for three postdoctoral researchers in the Department of Mathematics

2020–2021	Search committee for four postdoctoral researchers in the Department of Mathematics
2018–2019	Search committee for tenure track faculty position in Computational Modeling and Data Analytics (CMDA) in the Department of Statistics
2015	Search committee for tenure track faculty position in Mathematical Biology in the Department of Mathematics
2015	Search committee for two tenure track faculty position in Computational Modeling and Data Analytics (CMDA) in the Department of Statistics
2014	Search committee for an instructor position in Computational Modeling and Data Analytics (CMDA) in the Department of Statistics

Teaching

● At Virginia Tech

2012–present	Computational Modeling and Data Analytics (CMDA) course development
Spring 2022	CMDA 4604: *Intermediate Topics in Mathematical Modeling*
Spring 2022	MATH 2406: *Mathematics in a Computational context*
Spring 2021	MATH 2406: *Mathematics in a Computational context*
Fall 2020	MATH 5415: *Optimization*
Spring 2019	MATH 2406: *Mathematics in a Computational context*
Fall 2018	MATH 5465: *Numerical Analysis*
Spring 2018	MATH 2406: *Mathematics in a Computational context*
Fall 2017	CMDA 3605: *Mathematical Modeling*
Spring 2017	MATH 2406: *Mathematics in a Computational context*
Fall 2016	CMDA 3605: *Mathematical Modeling*
Spring 2016	MATH 2406: *Mathematics in a Computational context*
Fall 2015	CMDA 3605: *Mathematical Modeling*
Spring 2015	MATH 2984: *Mathematics in a Computational context*
Fall 2014	CMDA 3605: *Mathematical Modeling*
Fall 2013	MATH 5415: *Numerical Optimization*
Fall 2013	CMDA 3605: *Mathematical Modeling*
Spring 2013	MATH 5516: *Mathematical Biology*
Fall 2012	MATH 4445: *Numerical Analysis*

● At Texas State University

2012	MATH 3373: *Calculus III*
2012	MATH 3323: *Differential Equations*
2011	MATH 4336: *Numerical analysis*
2011	MATH 3323: *Differential Equations*
2011	MATH 4663: *Undergraduate Research in Optimization (seminar course)*
Spring 2011	MATH 5360 *Special Topics in Mathematical Modeling*
Fall 2010	MATH 3323: *Differential Equations (two sections)*

- **At the University of Lübeck**

  Despite my pure research assignment, I volunteer to teach and mentor students at the University of Lübeck. My teaching spanned from holding seminars, teaching classes, and supervising term, bachelor, and master theses.

2006/2007	*Special Topics in Numerical Optimization, seminar*
2004	*Dynamics in Biology and Medicine, seminar*
2003/2004	*Numerical Analysis I, lecture, teaching assistant*
2003	*Numerical Analysis II, lecture, teaching assistant*
2002/2003	*Numerical Analysis I, lecture, teaching assistant*
2001	*Calculus II, lecture, teaching assistant*
2000/2001	*Linear Algebra I, lecture, teaching assistant*
1999	*Numerical Analysis, lecture, teaching assistant*

Supervised students

- **Ph.D. students**

2020–present	Ringer, H., *Surrogate Data, expected graduation May 2023*
May 2019	Slagel, J., *Row-Action Methods for Massive Inverse Problems, PhD thesis, joint with J. Chung*
July 2017	Krueger, J., *Identifying the dynamics of small and large microbial communities, PhD thesis*
May 2011	Göbel, B., *Relationship between brain activity and peripheral glucose metabolism - combining experimentally acquired data with mathematical models, Ph.D. thesis, advising*

- **Master students**

2021–present	Adjerid, H., *State estimation method for active distribution network, master thesis, expected graduation May 2023*
2020–present	Saniel, K., *Variable Projected Augmented Lagrangian, master thesis, expected graduation May 2022*
August 2020	Pi, H., *Massive inverse problems, master thesis*
December 2020	Cooper, J., *Gaussian processes for model reduction, master thesis*
July 2020	Macatula, R., *Gaussian processes for parameter estimation, master thesis*
May 2019	Kaperick, B., *Diagonal estimation, master thesis*
May 2017	Torrence, R., *Bayesian Parameter Estimation on Three Models of Influenza, master thesis*
April 2015	Slagel, J., *The Sherman Morrison iteration, master thesis, joint with J. Chung*
May 2012	Miller, G.F., *Theory and Application of Numerical Analysis to Select Problems in Physics, master thesis*
April 2008	Olesch, J., *Parameterschätzverfahren: Ein- und Mehrzielansatz, English: Parameter estimation: initial and multi value approach, diploma thesis*

- **Undergraduate research students (last 6 years)**

2021–present	Harrison, G., Deep sampling approaches, undergraduate research (CMDA), CMDA Undergraduate Research Grant
2020–2020	Gauza, S., *Covid-19 modeling and parameter estimation, undergraduate research (MATH)*

2019–2020	Pinho, M., *Least squares finite elements, undergraduate research (CMDA), Luther and Alice Hamlett Undergraduate Research Support*
2018–2019	Cooper, J., *Reduced order modeling using Gaussian processes, undergraduate research (CMDA), Luther and Alice Hamlett Undergraduate Research Support*
2018–2019	Maurais, A., *Atmospheric CO_2 modeling and uncertainty estimation, undergraduate research (CMDA)* *Winner of the Layman Prize for best undergraduate research for 2018*
2018–2019	Krinos, A., *Atmospheric CO_2 modeling and uncertainty estimation, undergraduate research (CMDA)* *Winner of the Layman Prize for best undergraduate research for 2018*
2018	Grady, T., *Parallel Randomized Iterative Methods, undergraduate research (CMDA), Luther and Alice Hamlett Undergraduate Research Support*
2018	Shaw, D., *Parallel Randomized Iterative Methods, undergraduate research*
2017	Wang, M., *Parameter estimation in thermal cooling, undergraduate research (CMDA)*
2015–2017	Kaperick, B., *Randomized SVD and diagonal estimation, undergraduate research* *Winner of the Layman Prize for best undergraduate research for 2017*
2016	Nguyen, K., *Least squares finite element methods, undergraduate research*
2015–2016	Macatula, R., *Experimental design and parameter estimation, undergraduate research (CMDA)*
2015	Winter, W., *Collocation methods, undergraduate research*