# Matthew Logan Reimherr

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## Professional Preparation

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|---|---|---|---|
| University of Utah | Mathematics | B.S. Honors 2006 | Advisor: L. Horváth |
| University of Utah | Statistics Emph. Math | M.S. 2008 | Advisor: L. Horváth |
| University of Chicago | Statistics | Ph.D. 2013 | Advisor: D.L. Nicolae |

## Appointments

Associate Professor of Statistics, Pennsylvania State University, 2019-Present.

PSU Affiliated Programs: B2D2K (Biomedical Big Data to Knowledge), CBIOS (Computation, Bioinformatics, and Statistics), CCBB (Center for Computational Biology and Bioinformatics), CMG (Center for Medical Genomics), Center for Machine Learning and Applications, Center for Mathematical Biology

Visiting Scholar, University of California, Berkeley, 2019

Simons Institute for Theory and Computing

Assistant Professor of Statistics, Pennsylvania State University, 2013-2019.

## Active Funding

2019–2022, NSF MMS 1853209, Formal Privacy for Complex Data Objects: $680,000. Principal Investigator (Co-PI: A. Slavkovic and M. Shriver).

2017–2020, NSF DMS 1712826, Developing New Frontiers in Functional Data Analysis: $190,347. Principal Investigator.

2018–2020, Penn State Fund for Innovation: $75,000 (Joint PI with John Liechty and Jeremiah Green).

2018–2019, FRIAS Penn State Collaborative Development Program: $30,000. Penn State Champion/PI (Freiburg Champion/PI: Philipp Harms; Co-PIs: B. Li, M. Shriver, T. Schmidt, S. Schlager, B. Sriperumbuder).

## Past Funding

2017-2019, NIDA P50 DA039838-03, Center for Complex Data To Knowledge in Drug Abuse and HIV Behavioral Science: $13,513,452. Co-Investigator (PI Linda Collins), 5% credit.

2016–2017, PSU Methodology Center Seed Grant, Developing Tools for Functional Generalized Linear Models for Analysis of Intensive Longitudinal Data: $20,000. Principal Investigator.

2016–2017, NSF 1625473, MRI: Acquisition of a Nikon SIM & STORM capable super-resolution fluorescent microscope as a shared instrument for the Penn State research community: $649,261. Faculty (PI: Charlie Anderson), 4% credit.

## Books

P. Kokoszka and M. Reimherr (2017). *Introduction to Functional Data Analysis*. Chapman & Hall/CRC.

## Publications

1. M. Reimherr and J. Awan. Elliptical perturbations for differential privacy. *Neural Information Processing Systems (NeurIPS)*, Accepted, 2019a

2. M. Reimherr and J. Awan. KNG: The K-norm gradient mechanism. *Neural Information Processing Systems (NeurIPS)*, Accepted, 2019b

3. W. Chu, R. Li, J. Liu, and M. Reimherr. Feature screening for generalized varying coefficient mixed-effect models with application to obesity. *Annals of Applied Statistics*, Accepted.

4. A. Mirshani, M. Reimherr, and A. Slavkovic. Formal privacy for functional data with Gaussian perturbations. In *International Conference on Machine Learning (ICML)*, 2019.

5. J. Awan, A. Kenney, M. Reimherr, and A. Slavkovic. Benefits and pitfalls of the exponential mechanism with applications to hilbert spaces and functional pca. In *International Conference on Machine Learning (ICML)*, 2019.

6. M. Reimherr, B. Sriperumbudur, and B. Taoufik. Optimal prediction for additive function-on-function regression. *Electronic Journal of Statistics*, 12(2):4571–4601, 2018.

7. A. Parodi and M. Reimherr. Simultaneous variable selection and smoothing for high-dimensional function-on-scalar regression. *Electronic Journal of Statistics*, 12(2):4602–4639, 2018.

8. S. Craig, D. Blankenberg, A. Parodi, I. Paul, L. Birch, J. Savage, M. Marini, J. Stokes, A. Nekrutenko, M. Reimherr, F. Chiaromonte, and K. Makova. Infant weight gain trajectories linked to oral microbiome composition. *Scientific Reports*, 8(1), 2018.

9. P. Constantinou, P. Kokoszka, and M. Reimherr. Testing separability of functional time series. *Journal of Time Series Analysis*, 39(5):731–747, 2018.

10. P. Kokoszka, H. Miao, M. Reimherr, and B. Taoufik. Dynamic functional regression with application to the cross-section of returns. *Journal of Financial Econometrics*, 16(3):461–485, 2018.

11. H. Choi and M. Reimherr. A geometric approach to confidence regions and bands for functional parameters. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 80(1):239–260, 2018.

12. J. R. Lasky, B. R. Forester, and M. Reimherr. Coherent synthesis of genomic associations with phenotypes and home environments. *Molecular Ecology Resources*, 18(1):91–106, 2018.

13. R. F. Barber, M. Reimherr, and T. Schill. The function-on-scalar lasso with applications to longitudinal gwas. *Electronic Journal of Statistics*, 11(1):1351–1389, 2017.

14. P. Constantinou, P. Kokoszka, and M. Reimherr. Testing separability of space-time functional processes. *Biometrika*, 104(2):425–437, 2017.

15. Z. Fan and M. Reimherr. High-dimensional adaptive function-on-scalar regression. *Econometrics and statistics*, 1:167–183, 2017.

16. O. Gromenko, P. Kokoszka, and M. Reimherr. Detection of change in the spatiotemporal mean function. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 79(1):29–50, 2017.

17. J. Petrovich and M. Reimherr. Asymptotic properties of principal component projections with repeated eigenvalues. *Statistics & Probability Letters*, 130:42–48, 2017.

18. W. Chu, R. Li, and M. Reimherr. Feature screening for time-varying coefficient models with ultrahigh dimensional longitudinal data. *The Annals of Applied Statistics*, 10(2):596, 2016.

19. P. Kokoszka, M. Reimherr, and N. Wölfing. A randomness test for functional panels. *Journal of Multivariate Analysis*, 151:37–53, 2016.

20. M. Reimherr and D. Nicolae. Estimating variance components in functional linear models with applications to genetic heritability. *Journal of the American Statistical Association*, 111(513):407–422, 2016.

21. M. Reimherr. Functional regression with repeated eigenvalues. *Statistics & Probability Letters*, 107:62–70, 2015.

22. M. Reimherr and D. Nicolae. A functional data analysis approach for genetic association studies. *The Annals of Applied Statistics*, 8(1):406–429, 2014.

23. P. Kokoszka and M. Reimherr. Asymptotic normality of the principal components of functional time series. *Stochastic Processes and their Applications*, 123(5):1546–1562, 2013a.

24. P. Kokoszka and M. Reimherr. Determining the order of the functional autoregressive model. *Journal of Time Series Analysis*, 34(1):116–129, 2013b.

25. P. Kokoszka and M. Reimherr. Predictability of shapes of intraday price curves. *The Econometrics Journal*, 16(3):285–308, 2013c.

26. M. Reimherr and D. L. Nicolae. On quantifying dependence: A framework for developing interpretable measures. *Statistical Science*, 28(1):116–130, 2013.

27. M. Reimherr and D. L. Nicolae. You've gotta be lucky: Coverage and the elusive gene–gene interaction. *Annals of human genetics*, 75(1):105–111, 2011.

28. A. Aue, S. Hörmann, L. Horváth, and M. Reimherr. Break detection in the covariance structure of multivariate time series models. *The Annals of Statistics*, 37(6B):4046–4087, 2009a.

29. A. Aue, L. Horváth, and M. L. Reimherr. Delay times of sequential procedures for multiple time series regression models. *Journal of Econometrics*, 149(2):174–190, 2009b.

30. L. Horváth, P. Kokoszka, and M. Reimherr. Two sample inference in functional linear models. *Canadian Journal of Statistics*, 37(4):571–591, 2009.

## Manuscripts Under Review

1. S. J. C. Craig, A. M. Kenney, J. Lin, I. M. Paul, L. L. Birch, J. Savage, M. E. Marini, F. Chiaromonte, M. L. Reimherr, and K. D. Makova. Polygenic risk score based on weight gain trajectories is a strong predictor of childhood obesity. *bioRxiv*, page 606277, 2019.

2. A. Mirshani and M. Reimherr. Adaptive function-on-scalar regression with a smoothing elastic net. *arXiv preprint arXiv:1905.09881*, 2019.

3. H. B. Kang, M. Reimherr, M. Shriver, and P. Claes. Manifold data analysis with applications to high-frequency 3d imaging. *arXiv preprint arXiv:1710.01619*, 2017.

4. J. Petrovich, M. Reimherr, and C. Daymont. Functional regression models with highly irregular designs. *arXiv preprint arXiv:1805.08518*, 2018.

5. M. Reimherr, B. Sriperumbudur, and H. B. Kang. Optimal function-on-scalar regression over complex domains. *arXiv preprint arXiv:1902.07284*, 2019

## Reviews, Discussions, and Miscellaneous

1. M. A. Cremona, H. Xu, K. D. Makova, M. Reimherr, F. Chiaromonte, and P. Madrigal. Functional data analysis for computational biology. *Bioinformatics (Oxford, England)*, 35 (17):3211, 2019.

2. G. Bopp, J. Ensley, P. Kokoszka, and M. Reimherr. Spatio-temporal Functional Data Analysis. In J. Mateau and R. Giraldo, *Geostatistical Functional Data Analysis: Theory and Methods*, Forthcoming. Wiley.

3. M. Reimherr. Comments on: Modular regression-a lego system for building structured additive distributional regression models with tensor product interactions. *TEST*, pages 43–45, 2019.

4. P. Kokoszka and M. Reimherr. Some recent developments in inference for geostatistical functional data. *Revista Colombiana de Estadística*, 42(1):101–122, 2019.

5. H. B. Kang and M. Reimherr. Comments on: The statistical analysis of acoustic phonetic data: exploring differences between spoken romance languages. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 67(5):1136, 2018.

6. P. Kokoszka and M. Reimherr. Discussion of "A General Framework for Regression Modelling." *Statistical Modelling*, **17**, 45–49, 2017.

7. Z. Fan and M. Reimherr. High-dimensional function-on-scale regression via the alternating direction method of multipliers. In *2016 3rd International Conference on Information Science and Control Engineering (ICISCE)*, pages 397–399. IEEE, 2016.

8. M. Reimherr, X.-L. Meng, and D. L. Nicolae. Being an informed bayesian: assessing prior informativeness and prior likelihood conflict. *arXiv preprint arXiv:1406.5958*, 2014.

## Awards and Accomplishments

| | |
|---|---|
| 2019 | Simons-Berkeley Research Fellow |
| | Noether Young Scholar Award, American Statistical Association |
| 2016 | ISNPS Travel Grant |
| 2012–2013 | University of Chicago William Rainey Harper Fellow |
| 2009 | Canadian Journal of Statistics Award for Best Paper of the Year |
| 2007 | VIGRE Graduate Fellow, University of Utah |
| 2006 | University of Utah Departmental Honors Degree |

## Advising

Advisor

- T. Schill, MS Statistics, 2014
- W. Chu, PhD Statistics, 2016 (with R. Li)
- B. Taoufik, PhD Statistics, 2016
- H. Choi, PhD Statistics, 2017
- P. Constantinou, PhD Statistics, 2017
- H.B. Kang, PhD Statistics, 2018
- J. Petrovich, PhD Statistics, 2018
- E. Sheen, MS Statistics, 2019
- A. Mirshani, PhD Statistics, 2019
- J. Awan, PhD Statistics, Exp 2020 (with A. Slavkovic)
- A. Kenney, PhD Statistics, Exp 2020 (with F. Chiaromonte)
- A. Rao, PhD Statistics, Exp 2021
- T. Boschi, PhD Statistics, Exp 2021 (with F. Chiaromonte)

Post-doc Advisor

- P. Constantinou (Joint with J. Liechty and J. Green), 2017-2018
- J. Li (Joint with F. Chiaromonte and K. Makova), 2017-2018
- M. Cremona (Joint with F Chiaromonte), 2017-2019

Committee Member

- Kwame Kankam, PhD Statistics, 2014
- Ye Yu, Phd Statistics, PhD Statistics, 2015
- Saena Park, PhD Statistics, 2015
- Arslan Zaidi, PhD Anthropology, 2016
- Victor Motta, PhD Hospitality Management, 2016
- Min Chen, PhD BioRenewable Systems, 2016
- Safa Eslambolchi, PhD Energy and Mineral Engineering , 2016
- Amanda Laurel Webb, PhD Architectural Engineering, 2017
- Liang Sun, PhD Higher Education, 2017
- Simone Sukhdeo, PhD Anthropology, 2017
- Sunhee Jang, PhD Counselor Education and Supervision, 2018

– Joshua Snoke, PhD Statistics, 2018
– Songshang Yang, PhD Statistics, 2018
– Sixtus Aguree, Phd Nutritional Science, 2019
– Matthew Neal, PhD Acoustics, 2019

## Presentations

2019 JSM, Denver, CO USA (Invited – Noether Award)
International Conference on Machine Learning (ICML), Long Beach, CA
ICSA Applied Statistics Symposium, Raleigh, NC USA (Invited)
UC Santa Barbara, Department of Statistics and Applied Probability Seminar
UC Davis, Department of Statistics Seminar
UC Berkeley, Simons Institute, Data Privacy Seminar
UC Berkeley, Simons Institute, Simons-Berkeley Fellows Seminar
UC Berkeley, Simons Institute, Workshop on Privacy and Data Analysis

2018 CMStatistics, Pisa, Italy (Invited)
Matrix Insitute FDA Workshop, Melbourne, Australia (Invited)
MD Anderson, Department of Biostatistics Seminar
Rice University, Department of Statistics Seminar
JSM, Vancouver, BC, Canada (Topic Contributed)
5th International Biostatistics Symposium, Guangzhou, China (Invited)
IMS-APRM, Singapore (Invited)
4th ISNPS Conference, Salerno, Italy (Invited)
SLDS/Nonparametric Statistics Conference, Columbia University, New York (Invited)
SDSS, Reston, Virginia USA (Invited)
Center for Medical Genomics Retreat, Penn State Hershey Medical School
Banff Research Station, Workshop on *Mathematical Foundations of Data Privacy* (Invited)
Duke, Department of Statistics Seminar
ENAR, Atlanta, GA USA (Invited)
Workshop on *Statistics of geometric features*, Issac Newton Institute, Cambridge, UK (Invited)
University of Washington, Department of Statistics Seminar

2017 10th CMStatistics Conference, London, UK (Invited)
Johns Hopkins, Department of Biostatistics Seminar
North Carolina State University, Department of Statistics Seminar
Columbia University, Department of Biostatistics Seminar
Workshop on Applications-Driven Geometric Functional Data Analysis, FSU (Invited)
Penn State Bioinformatics and Genomics Retreat (Invited)
Michigan State, Department of Statistics Seminar
International Seminar on Stability Problems for Stochastic Models, Debrecen, Hungary (Invited)
JSM, Baltimore, MD USA (Topic Contributed)

2016 9th CMStatistics Conference, Seville, Spain (Invited)
Graz University Conference in Honor of Lajos Horváth (Invited)
3rd ISNPS Conference, Aginon, France (Invited)
Politecnico di Milano, MOX Seminar, Milan, Italy
IASI Seminar, Rome, Italy

2015 Université libre de Bruxelles, Department of Mathematics Seminar
Newcastle University, School of Mathematics and Statistics Seminar
WNAR Conference, Boise State University (Invited)
BIRS Workshop on Functional Data Analysis, Banff, Canada
Penn State, Genomics Seminar

2014 University of Waterloo, Statistics Department Seminar
Penn State, Stochastic Modeling and Computing Seminar (Fall)
Tulane University, Mathematics Department Seminar
Penn State, Methodology Center Seminar Series
International Indian Statistical Association Conference

2013 Pennsylvania State University, Department of Statistics Seminar
University of Florida, Department of Statistics Seminar
University of North Carolina – Chapel Hill, Department of Statistics Seminar
Colorado State University, Department of Statistics Seminar
University of Washington, Department of Biostatistics Seminar
Yale University, Department of Statistics Seminar
University of Pennsylvania, Department of Statistics Seminar
Texas A&M University, Department of Statistics Seminar
University of Minnesota – Twin Cities, Department of Statistics Seminar
Boston University, Department of Mathematics and Statistics Seminar
Ohio State University, Department of Statistics Seminar
Harvard University, Department of Statistics Seminar
Penn State, Stochastic Modeling and Computing Seminar
Penn State, Comp and Stat Approaches for Integration of Genomic Variation Workshop

2012 Purdue, $8^{th}$ International Symposium on Statistics
Yale, NSF Workshop for High–Dimensional Data; (Poster)
UC Davis, Workshop on Analysis of High-Dimensional and Functional Data; (Poster)

2011 University of Chicago, Department of Statistics Student Seminar

2007 Second International Conference on Statistical Models for Financial Data; (Poster) Graz, Austria.

2006 Presentation of Honors Thesis at University of Utah Math Awards Ceremony.

## Service

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| 2019+ | Associate Editor *Annals of Applied Statistics* |
| 2017+ | Associate Editor *Journal of Multivariate Analysis* |
| 2016+ | Associate Editor *Statistical Modeling* |
| 2019+ | PSU Graduate Admissions Chair |
| 2013–2018 | PSU Graduate Admissions Committee |
| 2016–2018 | Associate Editor *Computational Statistics and Data Analysis* |
| 2018 | Co-organized PSU-Freiburg workshop on *Statistics for geometric data and applications to anthropology.* |
| 2018 | Invited Session Organizer CMStatistics (*Data Privacy and Statistical Disclosure Control*) |
| | Invited Session Organizer ISNPS (*Recent Advances in Functional Time Series*) |
| | ENAR Session Chair |
| 2017 | Invited Session Organizer CMStatistics (*High-Dimensional Functional Data Analysis*) |
| | JSM Session Chair |
| 2014–2015 | PSU Colloquium Chair |
| | PSU PhD Exam Chair |
| 2013–2014 | PSU Clogg Memorial Lecturship Committee |
| | PSU PhD Exam Committee |

## Teaching Experience

**Penn State University, Department of Statistics**

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|---|---|
| Stat 200: | Elementary Statistics |
| Stat 416: | Stochastic Modeling |
| Stat 440: | Statistical Computing |
| Stat 462: | Applied Linear Regression |
| Stat 505: | Applied Multivariate Statistical Analysis |
| Stat 515: | Stochastic Processes and Monte Carlo Methods |
| Stat 597: | Functional Data Analysis |

**Univeristy of Chicago, Department of Statistics**

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|---|---|
| Stat 200: | Elementary Statistics |
| Stat 234: | Statistical Models and Methods 1 |

**Univeristy of Utah, Department of Mathematics**

| | |
|---|---|
| Math 1070: | Intro to Statistical Inference |
| Math 3070: | Applied Statistics I |