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Current Position:

2025-present Professor, Department of Biostatistics and Informatics
Colorado School of Public Health, Aurora, CO

Education:

1995	Rice University, <i>summa cum laude</i>	B.A., Mathematics/Statistics B.A., Economics/French Studies
1997	University of Washington	M.S., Biostatistics
2000	University of Washington	Ph.D., Biostatistics

Academic Positions:

2014-2024	Chair, Department of Biostatistics and Informatics Colorado School of Public Health, Aurora, CO
2017-2019	Analytics Core Co-Director University of Colorado Data Science to Patient Value Initiative
2016	Interim Director, Biostatistics and Bioinformatics Shared Resource University of Colorado Comprehensive Cancer Center
2014-2019	Associate Director, Colorado Center for Biomedical Informatics and Personalized Medicine University of Colorado Anschutz Medical Campus, Aurora, CO
2011-2014	Investigator, The Methodology Center, Penn State University University Park, PA
2010-2014	Professor, Departments of Statistics and Public Health Sciences, Penn State University, University Park, PA
2009-2011	Adjunct Associate Professor, Department of Biostatistics, University of Michigan, Ann Arbor
2008-2014	Member, Center for Comparative Genomics and Bioinformatics Penn State University
2008-2014	Affiliate Faculty, Penn State Cancer Institute Penn State College of Medicine, Hershey
2007-2010	Associate Professor, Department of Public Health Sciences, Penn State College of Medicine, Hershey
2007-2010	Associate Professor, Department of Statistics, Penn State University, University Park

2007-2014	Affiliate Faculty, Integrated Biosciences (IBIOS) Program Penn State University, University Park
2005-2007	Associate Professor, Department of Biostatistics, University of Michigan, Ann Arbor
2003-2007	Assistant Member, UM Comprehensive Cancer Center
2002-2007	Affiliate Faculty, Bioinformatics Program University of Michigan, Ann Arbor
2001-2007	Affiliate Faculty, Center for Statistical Genetics University of Michigan, Ann Arbor
2001-2005	Assistant Professor, Department of Biostatistics University of Michigan, Ann Arbor

Professional Positions:

1996	Statistical Intern, Division of Clinical Statistics Abbott Laboratories, Waukegan, IL
1995–2000	Research and Teaching Assistant, Department of Biostatistics, University of Washington
2000	Postdoctoral Scholar, Institute for Pure and Applied Mathematics, University of California, Los Angeles

Awards and Honors:

2024	Fellow, Institute of Mathematical Statistics
2022	Featured Article, <i>APSselect</i> , American Physiological Society
2022-2024	Editor, <i>Sankhya B</i>
2021	University of Colorado Anschutz Medical Campus, Outstanding Research Collaboration Award
2020	Sigma Xi (Scientific Honor Society)
2018	Delta Omega (Public Health Honor Society)
2018	Outstanding Young Statistical Scientist Award, Applications Track International Indian Statistical Association
2018 – 2020	Co-Editor, <i>Biometrics</i>
2018	Keynote Speaker, Ohio Mass Spectrometry and Metabolomics Symposium
2015	Myrto Lefkopolou Distinguished Lecturer, Department of Biostatistics Harvard T.W. Chan School of Public Health
2015	University of Colorado Clinical and Translational Sciences Leadership in Innovative Team Science Program Participant
2014	University of Washington Department of Biostatistics Distinguished Alumni Speaker
2014 – present	Grohne-Stepp Endowed Chair in Cancer Research University of Colorado Cancer Center
2013 – 2015	Chair, Biostatistical Methods and Research Design Study Section, National Institutes of Health
2013	Mortimer Spiegelman Award, American Public Health Association
2012	Fellow, American Statistical Association
2012	Featured Cover Article, <i>Genomics</i>

2011	Faculty Scholar, Methodology Center, Pennsylvania State University
2010–2012	College of CSR Reviewers, National Institutes of Health
2008	Featured <i>Biomed Central</i> Editorial Board Member
2008	<i>Biometrics</i> Best Paper Award
2006	UM CCMB Pilot Grant Award
2001-2003	UM Bioinformatics Pilot Grant Award
2002	Pacific Symposium on Biocomputing Travel Award
2001	UM Prostate Cancer SPORE Seed Grant
2001	UM Cancer Center MUNN Idea Grant
1999	ENAR Student Travel Award
1999	Society of Clinical Trials Student Scholarship
1998–2000	NIH Predoctoral Cardiovascular Training Grant, Department of Biostatistics, University of Washington
1997	Donovan J. Thompson Outstanding Student Award for outstanding academic performance, Department of Biostatistics, University of Washington
1995–1997	National Science Foundation Graduate Research Fellowship
1995–1997	ARCS (Achievement Rewards for College Scientists) Fellowship Department of Biostatistics, University of Washington
1995	Phi Beta Kappa, Rice University
1994	Phi Sigma Phi, Rice University

Professional Affiliations:

1. Member, American Statistical Association (1997 to present)

- Secretary/Treasurer, ASA Biometrics Section, 2011 – 2013
- Chair, Biometrics Section, American Statistical Association, 2016.
- Chair, Section in Statistical Genetics and Genomics, American Statistical Association, 2018.
- Nominations Committee, 2023 – 2024
- Joint Statistical Meetings Program Chair, 2024.

2. Member, International Biometric Society (1998 to present)

- Member, Regional Committee (RECOM) board, Eastern North American Region (ENAR), 2011 – 2013
- Distinguished Student Paper Award Committee, ENAR, 2007 - 2009, 2015 – 2016.

- Program Chair, Eastern North American Region (ENAR), 2012.
- 3. Member, Institute of Mathematical Statistics (2019 to present)
- 4. Member, International Society for Computational Biology (2001 to 2003)
- 5. Member, International Indian Statistical Association, 2008 - present

Professional Leadership and Service:

University of Michigan:

Faculty Search: 2000-2001, 2001-2002, 2005-2006
 Candidacy: 2000-2001, 2001-2002, 2003 - 2004, 2005-2006 (chair), 2006 – 2007 (chair)
 Statistical Genetics Search Committee: 2001-2002, 2002-2003
 Web: 2002-2003
 Associate Director, Cancer Biostatistics Training Grant: 2005 – 2006
 Faculty-Student Affairs: 2003 - 2004
 Microarray Working Group Organizer: 2001 - 2004
 Bioinformatics Faculty Search Committee: 2001-2002
 Aging/Bioinformatics Faculty Search Committee: 2003-2004
 Bioinformatics Executive Advisory Committee: 2004 – 2005
 Bioinformatics Graduate Affairs Committee: 2006 – 2007
 Chair, Bioinformatics Pilot Grant Award Program: 2006
 Genome Sciences Training Grant Faculty: 2001-2007
 Genome Sciences Training Grant Review Panel: 2002, 2004, 2007

Penn State University:

Eberly Chair Search Committee: 2007
 Cliff Clogg Memorial Lecture Committee: 2008
 Ph.D. Qualifying Exam Committee: 2008, 2009
 Promotion and Tenure Committee: 2010
 Graduate Student Affairs Committee: 2009, 2010, 2011
 Admissions Committee: 2010, 2011
 Statistics Department Head Search Committee: 2009
 Associate Dean Search Committee: 2011
 CBIOS Training Grant Co-Director, 2013 – 2014

University of Colorado:

Chair, Space Committee, Colorado School of Public Health, 2014 – 2017
 Member, Space Committee, Colorado School of Public Health, 2017 – present
 Internal Reviewer, Department of Environmental and Occupational Health, , Colorado School of

Public Health, 2015

Chair, Search Committee, Associate Dean for Finance and Administration, Colorado School of Public Health, 2015

Search Committee, Molecular Diagnostics Laboratory Co-Director, Colorado Center for Personalized Medicine, 2015

Search Committee, Supercomputer Vendor Search, Colorado Center for Personalized Medicine, 2016

Search Committee, Medical Genetics Faculty Position, Colorado Center for Personalized Medicine, 2015

Investigator-Initiated Trial Review Committee, University of Colorado Cancer Center, 2016 – present

Internal Advisory Board, University of Colorado Lung SPORE, 2017, 2019

Search Committee, Associate Dean for Diversity, Equity and Inclusion, ColoradoSPH, 2021

Search Committee, Chair, Environmental and Occupational Health, ColoradoSPH, 2021 – 2022, 2022–2023

Shared Resources Oversight Committee, University of Colorado Cancer Center, 2022–present

Service to the Profession:

Invited Session Organizer, 2002 IISA Conference.

IMS Invited Session Organizer, 2003 Spring ENAR meeting.

Program Committee, Society of Mathematical Biology Annual Meeting, 2004.

Program Committee, NSF-DARPA workshop on Genomic Signal Processing, 2002, 2005, 2006.

Program Committee, Intelligent Systems for Molecular Biology, 2005.

Program Committee (Member At-Large), ENAR, 2007.

Program Chair, Biometrics Section, JSM, 2008.

Program Committee, International Conference on Computational Advances in Bio and Medical Sciences (ICCABS), 2011, 2014, 2019.

Program Chair, ENAR, 2012.

Program Committee, International Biometric Conference, 2014.

Organizing Committee, Frontiers of Hierarchical Modeling in Observational Studies, Complex Surveys and Big Data, 2014.

External Reviewer, Biostatistics Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, 2014

Program Committee, Graybill Conference, 2017.

Co-Chair, Program Committee, Biostatistical Modelling: A Conference in Honor of Jeremy Taylor's 60th Birthday, 2017.

Program Committee, 4th International Conference on Algorithms for Computational Biology, 2017.

Short Course Instructor, "Machine Learning for Big Data using Python and Spark", 2nd Seattle Symposium on Healthcare Data Analytics, 2016.

Panelist, Institute of Mathematical Statistics New Researchers Conference, 2019.

Panelist, Houston Chapter of the American Statistical Association Workshop on Communication, May 8, 2021.

Panelist, Frontiers in Causal Inference in Data Science: Perspectives from Leaders in Tech and Academia, University of Pennsylvania, May 28, 2021.

Scientific Advisory Board, BEAMS (Binational Early Asthma and Microbiome Study) study, University of Arizona, 2021 – 2025.

External Reviewer, Bren School of Information and Computer Science, University of California, Irvine, 2023.

Moderator, AAAS session on “Data Literacy in K-16: Nourishing the Next U.S. STEM Workforce”, 2024.

Local Organizing Committee, International Indian Statistical Association, 2023.

Nominations Committee, American Statistical Association, 2022 (chair), 2023 (member).

Program Chair, Joint Statistical Meetings, 2024.

Review, Referee and Editorial Activities:

Statistical Reviewer, *Radiology*, 2015 – 2017.

Biostatistical Editorial Board, *Journal of Clinical Oncology*, 2024 – 2026.

Referee for the following journals:

Biometrics, *Statistics in Medicine*, *Journal of Multivariate Analysis*, *Biostatistics*, *Statistics and Probability Letters*, *Lifetime Data Analysis*, *Bioinformatics*, *Biometrika*, *Genome Biology*, *Journal of the American Statistical Association - Theory and Methods*, *Journal of Computational and Graphical Statistics*, *IMA Volume Series*, *Bayesian Statistics 7*, *Nature Medicine*, *Diabetes Care*, *Journal of Statistical Planning and Inference*, *Journal of Biological Chemistry*, *Journal of the American Statistical Association - Applications and Case Studies*, *Comptes rendus biologies*, *Neurocomputing*, *Journal of Multivariate Analysis*, *American Journal of Pharmacogenomics*, *Computational Statistics and Data Analysis*, *FEBS Letters*, *Annals of Statistics*, *Aging Cell*, *Comparative and Functional Genomics*, *Statistical Applications in Genetics and Molecular Biology*, *New England Journal of Medicine*, *IEEE Transactions in Computational Biology and Bioinformatics*, *Journal of Clinical Oncology*, *Journal of Very Large Databases*, *Journal of National Cancer Institute*, *BMC Bioinformatics*, *Applied Statistics*, *Lancet*, *Cancer Epidemiology*, *Biomarkers and Prevention*, *Journal of the Royal Statistical Society Series B*, *PLOS Genetics*, *Nucleic Acids Research*, *American Journal of Management Science*, *Journal of Computational and Applied Mathematics*, *Journal of Clinical Endocrinology and Metabolism*, *Statistical Advances in the Biomedical Sciences* (book, 2 articles), *Meta-Analysis in Genetics* (book), *Statistica Sinica*, *Journal of Molecular Diagnostics*, *Proceedings of the National Academy of Sciences*, *BMC Developmental Biology*, *Journal of Proteome Research*, *Cancer Informatics*, *Canadian Journal of Statistics*, *Mammalian Genome*, *Pacific Symposium on Biocomputing*, *International Journal of Biostatistics*, *Gastroenterology*, *Statistical Papers*, *Genomics*, *BMC Cancer*, *Current Molecular Medicine*, *Statistical Analysis and Data Mining*, *Statistics and Computing*, *Neuroimage*, *Annals of Epidemiology*, *Journal of Biopharmaceutical Statistics*, *American Journal of Epidemiology*, *Nature*, *American Statistician*, *Journal of Proteomics and Bioinformatics*, *Nature Medicine*, *TEST*, *Journal of Psychiatric Research*, *JAMA*, *PLOS One*, *Journal of Biomedical Informatics*, *Clinical Cancer Research*, *Cancer Research*, *Computational and Mathematical Methods in Medicine*, *Genetic Epidemiology*, *Genome Medicine*, *Trends in Analytical Chemistry*, *BMC Medicine*, *Molecular Psychiatry*, *Respirology*, *Stat*, *Observational Studies*, *IEEE Access*, *Journal of ImmunoTherapy of Cancer*, *Scientific Reports*, *Patterns*, *Pattern Analysis and Applications*, *npj Precision Oncology*, *Nature Computational Science*, *Briefings in Bioinformatics*, *EBioMedicine*

National Science Foundation (NSF) Grant Reviewer, 2003, 2005.

European Union Young Research Investigator Award Reviewer, 2004.

Medical Research Council *ad hoc* Grant Reviewer, 2004.

National Institutes of Health *ad hoc* Grant Reviewer, 2004, 2006, 2007, 2008, 2009 (2 times), 2015, 2017

National Institutes of Health Challenge Grant Reviewer, 2009.
 National Security Agency (NSA) *ad hoc* Grant Reviewer, 2006.
 University of Cyprus Grant Reviewer, 2006.
 Reviewer, Springer-Verlag book proposal, 2006.
 Utah State University New Faculty Research Grant Reviewer, 2007.
 Pennsylvania Department of Health Grant Reviewer, 2007.
 Singapore Ministry of Health Reviewer, 2007.
 Qatar National Government Grant Reviewer, 2007.
 Reviewer, Neural Information Processing Systems (NIPS) Conference, 2009.
 U.S.-Israel Binational Science Foundation reviewer, 2010
 Netherlands Organization for Health Research and Development reviewer, 2010.
 Reviewer, Feasibility Studies for Collaborative Interaction for Minority Institution/Cancer Center Partnership (P20), National Institutes of Health, 2011
 Reviewer, The Netherlands Organisation for Health Research and Development, 2012
 Reviewer, Utilizing the PLCO Biospecimens Resource to Bridge Gaps in Cancer Etiology and Early Detection Research (U01), 2013
 Reviewer, Israel Science Foundation, 2015, 2016.
 Reviewer, NIH New Innovator's Award, 2016.
 Reviewer, Precision Medicine Initiative Cohort Program Coordinating Center, 2016.
 Reviewer, Big Data To Knowledge (BD2K) R25 grants, 2016.
 Chair, NIH Special Emphasis Panel, Methodology and Measurement, 2017 (twice)
 Co-Chair, National Institute of Environmental Health Sciences Special Emphasis Panel, Powering Research through Innovative Methods in Epidemiology, 2017.
 Reviewer, NIH TOPMed Systems Biology Data Analysis RFA, 2017
 Reviewer, Cutting Edge Informatics Tools for Illuminating the Druggable Genome (U01) RFA, 2018.
 Reviewer, Traceback Testing: Identification and Genetic Counseling of Mutation Carriers (U01) RFA, 2018.
 Reviewer, Mechanisms of Disparities in Etiology and Outcomes of Lung Cancer in the U.S.: The Role of Risk and Protective Factors RFA, 2019.
 Chair, Special Emphasis Panel for K awards, National Institutes of Environmental Health Sciences, 2019.
 Reviewer, National Institutes of Environmental Health Sciences Career Mentored Awards, 2020.
 Chair, NIH Special Emphasis Panel, Emergency Awards: Rapid Investigation of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and Coronavirus Disease 2019 (COVID-19), 2020.
 Reviewer, Program Project Grants (P01), National Cancer Institute, June 10-11, 2021.
 Reviewer, National Science Foundation, 2021, 2022, 2024.
 Reviewer, AHEAD Head and Neck Cancer (U01), National Institute of Dental and Craniofacial Research, 2023.
 Reviewer, Improving Methods for Conducting Person-Centered Oriented research, PCORI, 2024 (twice).

Associate Editor, *Biometrics*, 2006 - 2010, 2011 – 2017
 Associate Editor, *Statistics in Biosciences*, 2009 - present
 Editorial Board, *Molecular Cancer*, 2009 – 2017
 Editorial Board, *Cancer Informatics*, 2005 – 2017
 Associate Editor, *Statistica Sinica*, 2011 – 2014
 Associate Editor, *BMC Bioinformatics*, 2009 - 2014

Associate Editor, *BMC Medical Genomics*, 2008 - 2014
 Editorial Board, *BMC series*, 2005 – 2014
 Editorial Board, *BMC Proceedings*, 2007 – 2014
 Associate Editor, *EURASIP Journal on Signal Processing and Bioinformatics*, 2005 - 2008
 Associate Editor, *JASA - Theory and Methods*, 2008 – 2011
 Section Head, Bioinformatics and Algorithms, Section, *BMC Medical Genomics*, 2010 – 2012
 Associate Editor, *Statistical Applications in Genetics and Molecular Biology*, 2009 – 2012
 Associate Editor, *International Journal of Biostatistics*, 2009 – 2012
 co-Editor, *Biometrics*, 2018 – 2021
 Associate Editor, *Electronic Journal of Statistics*, 2022 – present
 Editorial Board, *Calcutta Statistical Association Bulletin*, 2021 – present
 Co-Editor, *Biometrics*, 2018 – 2020
 Co-Editor, *Sankhya B*, 2022 – 2024
 Associate Editor, *JRSS-A*, 2025 – present.

1. “Coarsened Confounding for Causal Inference”:
 - Center for Causal Inference, University of Pennsylvania, December 12, 2024.
2. “Adapting ecological concepts to the modeling of single-cell data”:
 - Joint Statistical Meetings, Portland, Oregon, August 8, 2024.
3. “Gaussian process modeling of single-cell data”:
 - Western North American Region Meeting, Ft. Collins, Colorado, June 11, 2024.
 - ASA Section on Statistical Genetics and Genomics Conference, Pittsburgh, PA, May 1, 2024.
4. “Navigating spatially-resolved cell imaging data: marrying deep learning and statistics”:
 - Department of Statistics, Florida State University, September 16, 2022.
5. “Navigating spatially-resolved cell imaging data”:
 - Department of Biostatistics, Memorial Sloan Kettering, November 3, 2021.
6. “Introduction to Causal modelling in biomedical research”:
 - Western North American Region Outreach Seminar Series, July 16, 2021.
7. “Enhancing interpretability of machine learning tools in radiomics”:
 - Joint Statistical Meetings, August 5, 2020.
 - Western North American Region Meeting, June 15, 2021.
8. “Surprises in high-dimensional causal inference”:
 - Department of Biostatistics, University of Michigan, November 14, 2019.
 - Biostatistics Group, Division of Cancer Epidemiology and Genetics, National Cancer Institute, September 7, 2020.

- Quantitative Sciences Group, Department of Medicine, Stanford University, November 11, 2020.
9. "Evaluating reproducibility with high-dimensional data"
 - Department of Computational Medicine and Biology, University of Michigan, Wednesday, November 13, 2019.
 10. "Revisiting propensity scores":
 - University of Colorado Data Science to Patient Value (D2V) seminar, May 21, 2019.
 11. "Sufficient dimension reduction and covariate overlap in causal inference":
 - 10th International Triennial Calcutta Symposium in Statistics, Calcutta University, December 28, 2018.
 - Department of Biostatistics, Mailman School of Public Health, Columbia University, November 14, 2018.
 12. "Thinking causally with high-dimensional databases":
 - Institute for Mathematics and its Applications, Minneapolis, Minnesota, November 6, 2018.
 - Canadian Statistical Science Institute-National Institute of Statistical Science Health Data Science Workshop, May 7, 2021.
 13. "Building multi-scale kernels for fMRI data using the Morlet transform"
 - Joint Statistical Meetings, Baltimore, Maryland, August 1, 2017.
 14. "Outlier profile analysis, with applications to cancer":
 - Biostatistical Modelling: A Conference in Honor of Jeremy Taylor's 60th Birthday, Ann Arbor, MI, June 10, 2017.
 15. "Model selection and estimation in causal inference":
 - Division of Biostatistics, University of Indiana, Indianapolis, IN, April 21, 2017.
 - Division of Biostatistics, Ohio State University, Columbus, OH, April 14, 2017.
 16. "Big data: what are they and where are we headed with them":
 - Keynote Speaker, ACCORDS Workshop on Big Data, Anschutz Medical Campus, October 13, 2016.
 17. "Some applications of machine learning methods to causal inference":
 - Keynote Session, International Indian Statistical Association, Corvallis, OR, August 20, 2016.
 - Division of Biostatistics, University of Minnesota, Minneapolis, MN, April 6, 2016.
 - Statistics Research Seminar, Department of Mathematical and Statistical Sciences, UC Denver, Denver, CO, March 29, 2016.

- Division of Biostatistics, University of Miami, Miami, FL, October 20, 2015.
18. "Kernel machine methods: back to the future":
 - Colloquium, Department of Statistics, Colorado State University, Ft. Collins, CO, December 5, 2016.
 - Myrto Lefkopolou Distinguished Lecture, Department of Biostatistics, Harvard School of Public Health, Boston, MA, September 24, 2015.
 19. "Stacking, support vector machines and censored data":
 - Graybill/International Chinese Student Association Conference, Ft. Collins, Colorado, June 16, 2015.
 20. "Funding for NIH grants: a reviewer's perspective":
 - ENAR Junior Researchers Workshop, Miami, Florida, March 15, 2015.
 - Graybill/International Chinese Student Association Conference, Ft. Collins, Colorado, June 16, 2015.
 21. "Kernel machine methods for high-throughput data":
 - Computational Biosciences Seminar Series, University of Colorado Health Sciences Center, Aurora, Colorado, February 2, 2015.
 - Beyond Bioinformatics Workshop, Statistical and Applied Mathematical Sciences Institute, September 14, 2014.
 22. "Measurement, inference and statistical science in the age of 'Big Data'":
 - American Public Health Association Annual Meeting, Boston, MA, November 5, 2013.
 23. "Multivariate statistical methods for genomic data integration":
 - Department of Statistics, University of Pennsylvania, Philadelphia, PA, March 27, 2014.
 - Department of Biostatistics and Medical Informatics, University of Wisconsin, January 7, 2014.
 - Department of Biostatistics and Informatics, University of Colorado, December 16, 2013.
 - Department of Biostatistics, University of Florida, November 14, 2013.
 - Joint seminar, Department of Biostatistics and Division of Oncology Biostatistics, Johns Hopkins University, August 28, 2013.
 24. "Penalized regression methods for variable selection in causal inference":
 - Joint Statistical Meetings, Montreal, Canada, August 5, 2013.
 25. "Data-adaptive modelling of propensity scores for causal inference":
 - Division of Biostatistics, Penn State College of Medicine, Hershey, PA, November 15, 2012.
 26. "Kernel Machines: an overview and recent developments":

- Department of Biostatistics, University of Michigan, Ann Arbor, MI, November 1, 2012.
 - Department of Biostatistics, M. D. Anderson Cancer Center, Houston, TX, February 19, 2013.
27. "Multivariate multiple testing procedures, with applications to finding gene fusions in TCGA data":
- Joint Statistical Meetings, San Diego, CA, August 1, 2012.
28. "Introducing shrinkage into the Benjamini-Hochberg procedure":
- International Chinese Statistical Association Applied Conference, Boston, MA, June 24, 2012.
29. "Multiple testing procedures in neuroimaging genomics":
- ENAR Annual Spring Meeting, Washington, DC, April 4, 2012.
30. "Extending the Benjamini-Hochberg procedure using spacings":
- Department of Biostatistics, University of Pittsburgh, Pittsburgh, PA, January 19, 2012.
 - Department of Statistics, University of South Carolina, Columbia, SC, February 1, 2012.
 - Department of Biostatistics, University of North Carolina, Chapel Hill, NC, February 22, 2012.
 - Biostatistics Research Branch, National Institute of Allergy and Infectious Diseases, Bethesda, MD, March 13, 2012.
31. "Meta-analysis of genomic data and multiple testing":
- Cancer Biostatistics Seminar, Department of Biostatistics, University of Michigan, Ann Arbor, MI, November 2, 2012.
 - Starr Lectureship, Department of Biostatistics, Brown University, Providence, RI, November 14, 2011.
 - Division of Biostatistics, Vanderbilt University, Nashville, TN, November 16, 2011.
32. "A multivariate Benjamini-Hochberg procedure, with applications to genomics":
- Indian International Statistical Association meeting, Raleigh, NC, March 24, 2011.
33. "What can machine learning do for you? Algorithmic approaches to causal inference":
- Methodology Center, Brownbag Seminar, Penn State University, February 21, 2011.
34. "Risk prediction: model averaging, stability and calibration":
- Division of Oncology Biostatistics, Johns Hopkins University, Baltimore, MD, February 17, 2011.
35. "Multiple testing: a view using spacings":
- Winter Workshop on high-dimensional data analysis, University of Florida, Gainesville, FL, January 14, 2011.

36. "Identification of copy number-associated gene expression alterations in microarray experiments":
 - Joint Statistical Meetings, Washington, D. C., August 4, 2009.
37. "Kernel machine-based methods in genomics":
 - Rao Prize Conference, Penn State University, University Park, PA, May 22, 2009.
38. "Model-based meta-analysis for analysis of data from chromatin immunoprecipitation experiments":
 - Division of Biostatistics, University of Southern California, Los Angeles, CA, July 23, 2009.
 - IMS Asia/Pacific Rim Meeting, Seoul, South Korea, June 29, 2009.
 - Department of Biostatistics and Bioinformatics and Human Genetics, Emory University, Atlanta, GA, April 23, 2009.
 - Division of Statistical Sciences, Cornell University, Ithaca, NY, April 1, 2009.
39. "Hierarchical Hidden Markov model-based meta-analysis of data from chromatin immunoprecipitation experiments":
 - Department of Human Genetics, UCLA, Los Angeles, CA, October 13, 2008.
40. "Genomic outlier profile analysis with estimated null distributions":
 - Biostatistics and Medical Informatics, University of Wisconsin, Madison, WI, September 26, 2008.
41. "Statistical issues in the design and analysis of '-omics' studies":
 - Bioinformatics and Medical Informatics Retreat, Penn State College of Medicine, Hershey, PA, January 22, 2008.
42. "Multiple testing procedures in genomic studies":
 - Silver Platinum Jubilee, Indian Statistical Institute, Calcutta, India, January 3, 2008.
43. "Kernel machines, mixed models and genomic studies":
 - Division of Biostatistics, Yale University, New Haven, CT, September 25, 2007.
 - Center for Comparative Genomics and Bioinformatics, Penn State University, University Park, PA, September 19, 2007.
 - Department of Biological Statistics and Computational Biology, Cornell University, September 12, 2007.
44. "Statistical methods for the analysis of phage epitope array data":
 - Statistics for Biomolecular Data Integration and Modeling Workshop, Ascona, Switzerland, June 11, 2007.
 - Interface meeting, Philadelphia, PA, May 25, 2007.

45. "Integrating copy number and gene expression microarray datasets":
 - Department of Epidemiology and Biostatistics, Memorial Sloan Kettering, New York City, New York, May 9, 2007.
46. "Towards inference of chromosomal aberrations from genomic data":
 - Department of Bioinformatics and Computational Biology, M. D. Anderson Cancer Center, Houston, Texas, October 2, 2006.
47. "Joint modelling of copy number and mRNA microarray data":
 - 2007 ENAR annual meeting, Atlanta, Georgia, March 12, 2007.
48. "Statistical Methods for Integration of Copy Number and transcript mRNA data":
 - Department of Statistics, Rice University, Houston, Texas, February 5, 2007.
 - Department of Biostatistics, Bioinformatics and Biomathematics, Georgetown University, Washington, D. C., September 1, 2006.
 - Joint Statistical Meetings, Seattle, Washington, August 8, 2006.
49. "Statistical Methods for Analysis of Genomic/Proteomic Data in Complex Tissue":
 - Statistical Society of Canada, University of Western Ontario, London, Ontario, May 29, 2006.
50. "Meta-analysis of genomic data and multiple testing":
 - Department of Statistics, Pennsylvania State University, State College, PA, March 14, 2006.
 - Department of Mathematics and Statistics, University of Windsor, Windsor, Ontario, March 9, 2006.
51. "Introduction to Statistical Methods for Genomic Data Analysis":
 - Association of Molecular Pathology Annual Meeting, Phoenix, Arizona, November 11, 2005.
52. "Multiple testing and shrinkage estimation":
 - Multiple Comparisons Procedures, Shanghai, China, August 18, 2005.
53. "Towards inference of chromosomal aberrations from genomic data":
 - Joint Statistical Meetings, Minneapolis, Minnesota, August 10, 2005.
54. "Combining Genomic Data in Human Cancer Studies":
 - Division of Oncology Biostatistics, Department of Oncology, Johns Hopkins University, Baltimore, Maryland, March 1, 2006.
 - Mathematical Biosciences Institute, Columbus, Ohio, April 22, 2005.
55. "Semiparametric Support Vector Machines for Gene Expression Data":

- Joint Statistical Meetings, Toronto, Canada, August 8, 2004.
 - Institute for Pure and Applied Mathematics, UCLA, June 4, 2004.
56. "Association Models for Bivariate Censored Data":
- Division of Biostatistics, Cleveland Clinic, April 23, 2004.
 - Division of Biostatistics, Columbia University, March 4, 2004.
57. "Statistical Methods for Chromosomal Localization using Gene Expression Data":
- Department of Biostatistics, University of Pittsburgh, February 17, 2005.
 - Division of Biostatistics, University of Minnesota, March 22, 2004.
 - Division of Biostatistics, Columbia University, March 3, 2004.
 - Department of Statistics, University of Tennessee-Knoxville, January 23, 2004.
 - Statistical Methods in Bioinformatics Seminar Series, Brown University, November 10, 2003.
58. "Statistical Methods for Clustering Microarray Data in Cancer Studies":
- First Canadian Workshop on Statistical Genomics, Toronto, Canada, September 3, 2003.
59. "Statistical Methods for the Analysis of Microarray Data":
- East Tennessee State University, January 22, 2004.
60. "Global cross ratio models for bivariate censored data":
- Fifth Triennial Symposium on Statistics, Calcutta University, Calcutta, India, December 29, 2003.
 - Department of Biostatistics, Johns Hopkins University, April 30, 2003.
61. "Meta-analysis of microarray data":
- Bioinformatics Seminar Series, Department of Statistics, Purdue University, February 1, 2005.
 - Biostatistics Seminar Series, Department of Statistics, University of Wisconsin-Madison, November 12, 2004.
 - International Indian Statistical Association Meeting, Dekalb, IL, June 14, 2002.
 - Joint Statistical Meetings, New York City, NY, August 8, 2002.
62. "Penalized Regression Models for the classification of tumors from microarray experiments":
- Center for Molecular Medicine and Genetics, Wayne State University, February 20, 2003.
 - Institute for Pure and Applied Mathematics, UCLA, June 21, 2002.
 - Department of Biostatistics, University of Minnesota, May 18, 2002.
 - Training Program in Bioinformatics, Texas A&M University, February 25, 2002.
 - Pacific Symposium on Biocomputing, Kauai, Hawaii, January 4, 2002.

63. "Mixture modelling of microarray data," Statistics Department, University of Washington, July 13, 2001.
64. "Semiparametric Analysis of Recurrent Failure Time Data Using Accelerated Rates Models":
 - Department of Epidemiology and Biostatistics, Imperial Cancer Research Fund, London, England, June 9, 2002.
 - Statistics 2001 Canada Conference, Concordia University, Montreal, Canada, July 2, 2001.
65. "Semiparametric Analysis of Recurrent Failure Time Data and Dependent Censoring":
 - Joint Statistical Meetings, Atlanta, Georgia, August 7, 2001.
 - Fourth Triennial Symposium on Statistics, Calcutta University, Calcutta, India, December 27, 2000.
66. "Marginal Regression Models for Recurrent and Terminal Events":
 - Department of Biostatistics, M.D. Anderson Cancer Center, Houston, Texas, March 27, 2000.
 - Department of Biometry and Epidemiology, Medical University of South Carolina, Charleston, South Carolina, March 24, 2000.
 - Department of Biostatistics, Harvard School of Public Health, Boston, Massachusetts, March 9, 2000.
 - Department of Biostatistics, University of North Carolina, Chapel Hill, North Carolina, March 6, 2000.
 - Division of Biostatistics, University of Minnesota, Minneapolis, Minnesota, March 3, 2000.
 - Department of Biostatistics, University of Michigan, Ann Arbor, Michigan, February 24, 2000.
 - Department of Statistics, University of Florida, Gainesville, Florida, February 17, 2000.
67. "Nonparametric Analysis of Recurrent Events and Death," Society of Clinical Trials Annual Meeting, Anaheim, California, May 3, 1999.
68. "Response Conditional Models for Correlated Binary Data," Third Triennial Symposium on Statistics, Calcutta University, Calcutta, India, December 27, 1997.

Papers Delivered at Professional Meetings

1. "Machine Learning Methods for Causal Inference," Contributed Paper, ENAR Spring Meeting, 2006, Tampa, Florida.
2. "Semiparametric Analysis of Recurrent Events and Dependent Censoring," Contributed Paper, ENAR Spring Meeting, 2001, Charlotte, North Carolina.
3. "Nonparametric Analysis of Recurrent Events and Death," Contributed Paper, ENAR Spring Meeting, 1999, Atlanta, Georgia.

Teaching Record:

Course Development:

University of Michigan:

- Biostatistics 646 (Data Analysis in Molecular Biology)
Responsibility: Course developer, Sole instructor
Description: This was an introductory class on high-throughput data analysis. Students had weekly homework assignments and developed a group project in bioinformatics.
Audience: Ph.D. students in Biostatistics, Bioinformatics and other programs
Number of students: 25
Number of credits: 3
Offered: Winter 2007
- Biostatistics 699 (Design and Analysis of Biomedical Investigations)
Responsibility: Course developer, Co-instructor
Description: This was a class for second-year master's students in which they received five datasets from clinical collaborators throughout the semester and developed analytic plans and wrote scientifically focused reports and gave presentations on their reports.
Audience: M.S./Ph.D. students in Biostatistics
Number of students: 25
Number of credits: 3
Offered: Winter 2007
- Biostatistics 503 (Applied Biostatistics)
Responsibility: Course developer, Lead instructor
Description: This was a class on introductory biostatistics that all students at the University of Michigan School of Public Health were required to take. It started with basic probability and statistics and ended with two-sample and regression analyses.
Audience: Master's of public health students
Number of students: 250
Number of credits: 3
Offered: Fall 2001
- Biostatistics 560 (Statistical Methods in Epidemiology)
Responsibility: Course developer, Lead instructor
Description: This was a class on statistical methods for second-year epidemiology students at the University of Michigan. The class covered logistic regression, survival analysis. In the last two years, I added modules on correlated data analysis.
Audience: Master's of public health students
Number of students: approximately 80/year
Number of credits: 3
Offered: Fall 2002, Fall 2003, Fall 2004, Fall 2005

- Biostatistics 602 (Biostatistical Inference)
 Responsibility: Course developer, Lead instructor
 Description: This was a class on statistical inference that went through the latter half of the textbook *Statistical Inference* by Casella and Berger. Students learnt about properties of estimators, asymptotics, hypothesis testing and Bayesian inference.
 Audience: M.S./Ph.D. students in Biostatistics, Statistics and other departments
 Number of students: approximately 55/year
 Number of credits: 3
 Offered: Winter 2002, Winter 2003, Winter 2005
- Biostatistics 830 (Machine Learning Methods in Biostatistics)
 Responsibility: Course developer, Lead instructor
 Description: This was a special topics on machine learning that covered both algorithms and attendant theory based on concentration of measure.
 Audience: Ph.D. students in Biostatistics, Statistics and other departments
 Number of students: 20
 Number of credits: 3
 Offered: Fall 2005
- Bioinformatics 526 (Introduction to Bioinformatics)
 Responsibility: Guest lecturer
 Description: I provided two 1-hour lectures on high-throughput data analysis regarding study design and analysis.
 Audience: M.S./Ph.D. students in Bioinformatics and other departments
 Number of students: 10
 Number of credits: 3
 Offered: Fall 2002, Fall 2003

Penn State University:

- Statistics 525 - Survival Analysis
 Responsibility: Course developer, Lead instructor
 Description: This was a class on advanced survival analysis that I taught to Ph.D. students in statistics. The class touched on the use of various methods for the analysis of right-censored data along with attendant theoretical results.
 Audience: Ph.D. students in Statistics
 Number of students: Approximately 12/year
 Offered: Spring 2008, Spring 2009
- Statistics 505 - Applied Multivariate Statistical Analysis
 Responsibility: Course developer, Lead instructor
 Description: This was a class on applied multivariate analysis that I taught to students in departments outside of Statistics at Penn State. We covered machine learning ideas such

as clustering and classification. We implemented all of the methods we learned in the class in R.

Audience: Ph.D. students in Ecology, Biology, and other departments

Number of students: Approximately 50/year

Offered: Fall 2009, Fall 2010, Fall 2011

- Statistics 544 - Categorical Data Analysis

Responsibility: Course developer, Lead instructor

Description: This was a class on advanced categorical data analysis that I taught to students in departments outside of Statistics at Penn State. We covered various topics such as contingency table tests, regression models for independent and correlated categorical data.

Audience: Ph.D. students in Statistics

Number of students: 22

Offered: Fall 2010

University of Colorado:

- BIOS 6640 - R and Python for Data Science

Responsibility: Course developer, Lead instructor

Description: This was a class on advanced programming in R and Python that I taught to students interested in data science. We covered various topics in software engineering, data structures and programming language theory in R and then saw the analogous ideas in Python.

Audience: MPH, M.S., Ph.D. students in Biostatistics and other departments

Number of students: 22, 14

Offered: Spring 2016, Fall 2017

- BIOS 6640 - R for Data Science

Responsibility: Course developer, Lead instructor

Description: This was a class on programming in R and Python that I taught to students interested in data science. We covered various topics in software engineering, data structures and programming language theory in R and then saw the analogous ideas in Python.

Audience: MPH, M.S., Ph.D. students outside Biostatistics

Number of students: 22

Offered: Fall 2019

- BIOS 6641 - Causal Analytics in Public Health

Responsibility: Course developer, Lead instructor

Description: This was a class on causal inference and some basic machine learning that I taught primarily to graduate students in Biostatistics and Epidemiology.

Audience: MPH, M.S., Ph.D. students in Biostatistics and Epidemiology.

Number of students: 14

Offered: Spring 2017

- BIOS 7717 - Bayesian Statistics
Responsibility: Instructor
Description: This was a class on Bayesian methods that I taught primarily to graduate students in Biostatistics and Informatics.
Audience: Ph.D. students in Biostatistics and related departments.
Number of students: 10
Offered: Spring 2018
- BIOS 7732 - Theory and Algorithm for Data Science
Responsibility: Instructor
Description: This was a class on methods and inference for high-dimensional data in conjunction with algorithmic theory taught primarily to doctoral students in Biostatistics and Informatics.
Audience: Ph.D. students in Biostatistics and related departments.
Number of students: 25 (2022), 19 (2024)
Offered: Spring 2022, Spring 2024
- BIOS 6690 - MPH Capstone Preparation
Responsibility: Instructor
Description: This is the first of the two-semester sequence for the capstone project that MPH students are required to take
Audience: MPH students in Biostatistics and related departments.
Number of students: 8 (2021), 9 (2022), 11 (2023), 12 (2024))
Offered: Fall 2021, Fall 2022, Fall 2023, Fall 2024

Mentoring:

University of Michigan:

Ph.D. Mentoring:

Dawei Liu, Biostatistics, 2002 – 2005 (co-chair with X. Lin), currently Statistician, Celgene
 Wei Chen, Biostatistics, 2002 – 2006 (co-chair with T.E. Raghunathan), currently Associate Professor of Oncology, Wayne State University
 Zheng Yuan, Biostatistics, 2004 – 2006, currently Ph.D. Biostatistician, Clinical Oncology, Eli Lilly
 Ronglai Shen, Biostatistics, 2002 – 2007 (co-chair with J. Taylor), currently Associate Investigator, Division of Epidemiology and Biostatistics, Memorial Sloan-Kettering Cancer Center
 Hyungwon Choi, Biostatistics, 2006 – 2008 (co-chair with Z. S. Qin), currently Associate professor, Department of Biostatistics and Epidemiology, National University of Singapore Graduate Medical School
 Laila Poisson, Biostatistics, 2003 – 2009 (co-chair with J. Taylor), current position, associate professor, Department of Epidemiology and Biostatistics, Henry Ford Health System

Ph.D. Exam Committee:

Mike Epstein, Biostatistics, 2001 – 2002.
Nichole Carlson, Biostatistics, 2001– 2003.
Jasmanda Wu, Epidemiology, 2001– 2002.
Shibao Feng, Biostatistics, 2001 – 2003.
Lei Liu, Biostatistics, 2001 – 2004.
Stephanie Borchardt, Epidemiology, 2003 – 2004.
Debbie Lown, Epidemiology, 2002 – 2005.
Al Levin, Epidemiology, 2003 – 2005.
Adi Andrei, Biostatistics, 2003 – 2005.
Laura McEwen-Mattei, Epidemiology, 2003 – 2005.
Shona Dallal, Epidemiology, 2003 – 2005.
Abdullah AlSwuaillem, Epidemiology, 2003 – 2005.
Chris Riolo, Epidemiology, 2000 – 2005.
Hsin-Jen Tsai, Nutritional Sciences, 2003 – 2006.
Patty Juliao, Epidemiology, 2002 – 2006.
Ying Kong, Epidemiology, 2004 – 2006.
Akarin Pharibul, Statistics, 2002 – 2006.
Dan Rhodes, Bioinformatics, 2004 – 2006.
Chad Creighton, Bioinformatics, 2004 – 2006.
Andrew Skol, Biostatistics, 2005 – 2006.
Rohit Kulkarni, Statistics, 2005 – 2006.
Aaron Sussell, Occupational and Environmental Health, 2002 – 2006.
Melissa Slotnick, Occupational and Environmental Health, 2004 – 2007.
Vivian Colon, Epidemiology, 2005 – 2007.
Kai Bullard, Epidemiology, 2005 – 2007.
Angela Liu, Biostatistics, 2006 – 2007.

Penn State University:

Ph.D. Mentoring:

Muhammad Atiyat, Statistics, 2008 – 2011, currently Statistician, United Nations
Scott Roths, Statistics, 2009 – 2011 (joint with Prof. G. Jogesh Babu), currently Lecturer,
Department of Statistics, Penn State University
Yeying Zhu, Statistics, 2010 – 2013 currently Associate Professor,
Department of Statistics and Actuarial Sciences, University of Waterloo
Yihan Li, Statistics, 2010 – 2014, currently Biostatistician, AbbVie Pharmaceuticals
Daisy Phillips, Statistics, 2011 – 2014, currently assistant professor
Department of Statistics, Penn State University
Wen-Yu Hua, Statistics, 2011 – 2014, currently statistician
Amazon.com
Youngjoo Cho, Statistics, 2011 – 2014, currently assistant professor
Department of Mathematical Sciences, University of Texas-El Paso
Xiang Zhan, Statistics, 2011 – 2014, currently assistant professor
Division of Biostatistics, Penn State College of Medicine

Ph.D. Exam Committee:

Sujana Ghosh, Biochemistry and Molecular Biology, 2008 – 2011
Ho Sung Rhee, Biochemistry and Molecular Biology, 2008 – 2011
Yan Zhuang, Agricultural Economics and Rural Sociology, 2009 – 2010
Jianping Sun, Statistics, 2009 – 2010
Chris Groendyke, Statistics, 2009 – 2010
Julia Jennings, Anthropology and Demography (Minor in Statistics), 2010
Song Li, Integrative Biosciences, 2010
Zhenhai Zhang, Bioinformatics, 2009 – 2011
Kiranmoy Das, Statistics, 2010 – 2011
Junyi Lin, Statistics, 2009 – 2011
Duy Vu, Statistics, 2010 – 2013
Qiuying Shen, Biology, 2011
Jian Li, Biochemistry and Molecular Biology, 2009 – 2012
Jialin Xu, Statistics, 2010 – 2012
Qianyi Ma, Nutritional Sciences, 2010 – 2012
Isaac Dialsingh, Statistics, 2010 – 2012
Celine Han, Integrative Biosciences, 2011 – 2015
Rene Koo Flasher, Accounting, 2011 – 2013
Denise Finney, Crop and Soil Sciences, 2011 – 2015
Anjel Helms, Ecology, 2011 – 2015
Yao Zheng, Human Development and Family Studies, 2012 – 2014
Neerja Katiyar, Integrative Biosciences, 2012 – 2013
Vishesh Karwa, Statistics, 2012 – 2014
Xizhen Cai, Statistics, 2012 – 2014

University of Colorado:

M.S. Mentoring:

Katherine Roberts, Biostatistics and Informatics, 2015 – 2017
Alexandria Jensen, Biostatistics and Informatics, 2015 – 2017
Derek Smith, Biostatistics and Informatics, (joint with Anna Barón), 2016 – 2017
Ted Warsavage, Biostatistics and Informatics, (joint with Fuyong Xing and Anna Barón), 2017 – 2019
Cameron Severn, Biostatistics and Informatics, (joint with Krithika Suresh), 2019 – 2020
Jonathan Dekermanjian, Biostatistics and Informatics, (joint with Katerina Kechris), 2020 – 2021
David Johnson, Biostatistics and Informatics, 2023

M.S. Exam Committee:

Elise Ameoka, Biostatistics and Informatics, 2017
Kayla Williamson, Biostatistics and Informatics, 2017
Cuining Liu, Biostatistics and Informatics, 2019
Emma Jones, Biostatistics and Informatics, 2019
Jinal Shah, Biostatistics and Informatics, 2025

Ph.D. Mentoring:

Manish Dalwani, Biostatistics and Informatics, 2014 – 2017, currently Senior Director of Data Science, Procter & Gamble

Kyle Smith, Computational Biosciences, 2016 – 2017, currently Bioinformatics Staff Scientist, St. Jude's Hospital, Memphis, Tennessee

Alex Jensen, Biostatistics and Informatics, 2018 – 2022, currently Staff Scientist, Stanford University School of Medicine

Kevin Josey, Biostatistics and Informatics, 2016 – 2020 (Joint with Fan Yang and Elizabeth Juárez-Colunga)

Charlie Carpenter, Biostatistics and Informatics, 2020 – 2023 (Joint with Brandie Wagner)

Emily Mastey, Computational Biosciences, 2019 – 2024

Lei Wang, Biostatistics and Informatics, 2023 – present

Ph.D. Exam Committee:

Bryan Vestal, Biostatistics and Informatics, 2015 – 2017

Peter Dewitt, Biostatistics and Informatics, 2015 – 2017

KaraAnn Clouse, Health Services Research, 2014 – 2017

Eline Van der Broek, Health Services Research, 2016 – 2017

Angela Czaja, Pharmaceutical Sciences, 2017 – 2019

Sarah Ryan, Biostatistics and Informatics, 2019 – 2022

Yonghua Zhang, Biostatistics and Informatics, 2019 – 2022

Xinyi Yang, Biostatistics and Informatics, 2022 – present

Suneeta Godbole, Biostatistics and Informatics, 2023 – 2024

Hongyu Du, Biostatistics and Informatics, 2024 – present

Post-Doctoral Mentoring:**Penn State University:**

Yeonok Lee, Statistics, 2011 – 2014 (joint with Y. Zhang), currently statistical modeller, Development Office, St. Jude's Children Hospital.

University of Colorado:

Pratyaydipta Rudra, Biostatistics and Informatics (joint with Katerina Kechris), 2015 – 2018, currently Associate Professor, Department of Statistics, Oklahoma State University

Xuhong Zhang, Biostatistics and Informatics, 2017 – 2020 (joint with Fuyong Xing), currently Assistant Professor, Department of Computer Science, Indiana University

Efrén Cruz-Cortes, Biostatistics and Informatics, 2017 – 2019, currently Postdoctoral Fellow, University of Michigan

Olivier Simon, Biostatistics and Informatics, 2018 – 2021, currently self-employed

Tushar Ghosh, Biostatistics and Informatics, 2018 – 2022

currently Research Associate, Department of Biostatistics and Informatics, Colorado School of Public Health

Elin Shaddox, Biostatistics and Informatics, 2019 – 2022 (joint with Katerina Kechris)

Debmalya Nandy, Biostatistics and Informatics, 2019 – 2022 (joint with Katerina Kechris)

Zachary Richardson, Biostatistics and Informatics, 2019 – 2020

Souvik Seal, Biostatistics and Informatics, 2020 – 2023 (joint with Katerina Kechris)

Thao Vu, Biostatistics and Informatics, 2020 – 2023 (joint with Katerina Kechris)
Ismaila Baldé, Biostatistics and Informatics, 2023

Research Record:

Current Grants

NSF SES-2149492 (Ghosh, P.I.) 9/1/22 - 8/31/25

Empirical and Causal methods for heterogeneous data fusion

Total \$94,000.00/year

In this proposal, the PI and team will focus their research in two areas. The first will be to develop a unified weighted regression framework and attendant theory for heterogeneous data fusion and its extensions to multiple data sources. Second, we will develop new causal inferential approaches for heterogeneous data fusion. In addition, there will be meaningful educational impact in terms of (a) dissemination of the research findings through software, coursework and research and (b) training of graduate students at the University of Colorado.

Role: Principal Investigator

Lupus Research Alliance Global Team Science Award (Hsieh/Casanova/Vogel/Jackson/Hodgin/Ghosh, P.I.), 10/1/23 - 9/30/26

Genetic and immunological determinants of childhood lupus nephritis

Total: \$1,000,000/year

Systemic lupus erythematosus (SLE) is a multi-organ rheumatologic disease with heightened renal disease incidence and severity in children. Unfortunately, few children with childhood-onset lupus nephritis (cLN) achieve complete remission using available therapies, resulting in accumulating damage and progression to chronic kidney disease. The objective of this proposal is to determine the precise molecular, cellular, and histopathological features of cLN in a manner that is spatially localized within kidney stromal compartments, and to correlate these with clinical outcomes.

Role: co-Principal Investigator (Hsieh, contact PI)

Colorado Resource Center for Tribal Epidemiology Centers

(Manson/O'Connell, P.I.), 7/15/22 - 3/30/27

Total: \$2,192,901/year

Despite their potential to advance the research agenda regarding American Indian/Alaska Native health disparities, Tribal Epidemiology Centers have fallen short of this promise due to limited scientific capacity. The Center will mobilize a wealth of resources to enable them to contribute significantly to such research.

Role: co-Investigator

Completed Funding

Title: New methods in high-dimensional causal inference (NSF DMS-1914937)

Funding Agency: National Science Foundation

Summary: This grant is intended to look at the foundational issues of using causal inference methods with deep learning algorithms in high-dimensional datasets.

Funding Period: 9/1/19 - 8/31/22

Award Amount: \$149,779

Role: Principal Investigator

Title: Development and Dissemination of KiNet: A Novel Imaging Informatics Tool for Gastrointestinal and Pancreatic Neuroendocrine Tumors (R21 CA237493)

Funding agency: NIH/NCI

Summary: This proposed research is to develop and disseminate a novel advanced machine learning-based imaging informatics system to better quantify Ki67 images for effective and efficient single-stage Ki67 LI assessment for GI and pancreatic NETs.

Funding Period: 04/02/2019 03/31/2021

Award Amount: \$372,034

Role: Co-Investigator

Title: Addressing Sparsity in Metabolomics Data Analysis (U01 CA235488)

Funding agency: NIH/NCI

Summary: In this proposal, we will consider sparsity that occurs in a variety of steps in the metabolomics preprocessing pipeline and develop new statistical and computational tools to handle it.

Funding Period: 8/15/18 - 7/31/22

Award Amount: \$1,700,034

Role: Principal Investigator

Title: Statistical Methods for Cancer Biomarkers (CA129102)

Funding agency: NIH/NCI

Summary: In this proposal, we develop methods for incorporating external risk calculator information in biomarker analyses.

Funding Period: 1/1/09 - 12/31/22

Award Amount: \$1,300,045

Role: Principal Investigator of CU-Anschutz subcontract

Title: Role of Eya3 in regulating the immune microenvironment to promote breast tumor progression (CA221282)

Funding Agency: NIH/NCI

Summary: In this proposal we will test the hypothesis that Eya3 regulates breast tumor growth and progression via its ability to recruit PP2A, leading to increased levels of PD-L1 and a diminished tumor-specific T-cell response.

Funding Period: 07/01/2017-06/30/2022

Award Amount: \$3,009,735

Role: Co-Investigator

Title: Examining the EYA2/MYC axis in Group 3 Medulloblastoma (CA224867)

Funding Agency: NIH/NCI

Summary: Work in this proposal will test a new model for medulloblastomas and will test the roles of EYA2 and Myc in a subpopulation of medulloblastomas.

Funding Period: 08/01/2018-05/31/2022

Award Amount: \$3,470,540

Role: Co-Investigator

Title: Persistence of Protection Conferred by Shingrix Against Herpes Zoster in Older Adults (AI141919)

Funding Agency: NIH/NIAID

Summary: This proposal aims to study local and systemic transcriptomic and epigenetic changes in response to shingrix vaccination with two different types of vaccines.

Funding Period: 01/01/2019-12/31/2023

Award Amount: \$3,646,225

Role: Co-Investigator

Title: Novel integrative approaches for disease phenotyping, utilizing radiomics in sarcoidosis (HL142049)

Funding Agency: NIH/NHLBI

Summary: The goals of this proposal are to develop reproducible radiographic phenotypes of pulmonary sarcoidosis and integrate radiographic data with clinical data, genetic variants and transcriptional signatures, redefining sarcoidosis biomarkers.

Funding Period: 4/1/2019 - 3/31/2023

Award Amount: \$2,620,108

Role: Co-Investigator

Title: Colorado and Clinical Translational Sciences Institute (TR002535)

Funding Agency: NIH/NCATS

Summary: The Colorado Clinical and Translational Sciences Institute (CCTSI) at the University of Colorado Denver (CU-D) has taken impressive steps to transform and improve the biomedical research and training enterprise in the Colorado region and to accelerate and catalyze the translation of discoveries into improved patient care and public health.

Funding Period: 4/1/2019 - 3/31/2023

Award Amount: \$39,192,355

Role: Biostatistician

Title: Spatial Mapping of Proteomic and Transcriptional Signatures in Kidney Disease

Funding Agency: NIDDK

Summary: We propose to utilize complementary spatial protein and RNA technologies to generate comprehensive tissue atlases for AKI and CKD.

Funding Period: 9/15/22 - 6/30/24

Award Amount: \$834,000

NIH R01GM117946 (MPIs: M. Epstein, Emory University; D Ghosh) 1/1/16 - 12/31/19

Statistical Tests for Mapping Genetic Determinants of Complex Traits

Total \$125,000/year (UC-Denver subcontract)

Genome-wide association studies (GWAS) and next-generation sequencing (NGS) projects have uncovered only a limited number of trait-influencing loci. While large increases in sample size will improve power to detect such variation, the ascertainment and sequencing/genotyping of such samples are costly and inefficient. Therefore, it is desirable to increase power to detect such variants without requiring additional sample collection. We propose novel methods for improved gene mapping of common and rare susceptibility variants that move beyond standard strategies typically applied to GWAS and NGS studies of complex traits.

Role: Principal Investigator (PI of UC-Denver subcontract)

NSF ABI-1262538 (Ghosh, P.I.) 7/1/13 - 3/31/17

Multivariate Statistical Methods for Genomic Data Integration

Total \$177,027.00/year

This research focuses on multivariate methods of analysis with high-dimensional genomic data, with the goal of prioritizing the genome for further study. Two classes of problems will be studied during the course of the project. The first is Hidden Markov Models and the second is multiple testing procedures, whose use have become commonplace with genomic datasets. This project proposes novel multivariate extensions of both types of method with a goal of being characterized by sound theoretical statistical principles while simultaneously being computationally feasible on big datasets. The methodology will be evaluated using several real datasets as well as through simulation studies.

Role: Principal Investigator

NIH 1T32GM102057-01A1 (MPIs: R. Hardison, D. Ghosh, and C. Shashikant, Penn State University), 07/01/13 - 06/30/14

Total: \$80,713/Year 1

Computation, Bioinformatics, and Statistics (CBIOS) Training Program

Genomic data are transforming how scientists in medicine and basic science conduct research. The advancement of genome science requires a new generation of scientists with strong computational and statistical skills and the ability to effectively interact with experimentalists. The proposed Penn State Computation, Bioinformatics, and Statistics (CBIOS) Training Program will prepare a cadre of investigators to think innovatively and keep pace with the quickly evolving landscape of high throughput genomic technologies. The program faculty are interdisciplinary and highly collaborative, with expertise in computation, bioinformatics, statistics, functional, medical, and evolutionary genomics. Learning these discipline-crossing skills will make trainees competitive for future careers in emerging and rapidly advancing fields of comparative, systems, statistical and medical genomics.

Role: Co-Director/Principal Investigator

NIH UL1RR033184 (PI: L. Sinoway, Penn State University/Penn State College of Medicine), 09/01/11 - 06/30/2014

Penn State Clinical and Translational Institute

Total: \$5,468,625/year

This proposal describes the newly created Penn State Clinical and Translational Science Institute (CTSI). The overarching goal of our CTSI initiative is to revitalize the health science research and education enterprise at our University to better enable it to deliver on the promise of improved

health.

Role: Biostatistician

NIH R01GM066411-05A2 Omiecinski (PI) 12/15/09 – 11/30/2013

Functional Analysis of Nuclear Receptor Variants

Total: \$314,000/year

In this grant, our studies will characterize the roles of a novel series of receptor proteins that interact with pharmaceuticals and environmental chemicals and function to regulate the liver's capacity to metabolize substances. These receptors are termed constitutive androstane receptors and are part of a battery of sensing proteins that exist with liver cells to assist in processing the nature of the cell's chemical environment so that it can better tune its ability to detoxify chemicals we are exposed to.

Role: Co-Investigator

NIH/NSF 1 R01 GM72007 (PI: D. Ghosh), 09/01/04 – 08/31/10

Statistical Methods for the Analysis of Functional Genomic Data

Total: \$150,000/year

The goal of this project is to develop statistical and bioinformatic procedures for the modeling of complex high dimensional biological data with an emphasis towards incorporating functional biological knowledge.

Role: Principal Investigator

Co-Investigators: A. Chinnaiyan (Univ. of Michigan, 2004-2007), F. Pugh (Penn State, 2007 - 2008)

NIH 5R01HG003618 (PI: M. Epstein, Emory University), 09/27/07 – 08/26/2009

Novel Statistical Methods for Human Gene Mapping

Total: \$200,000/year

This grant proposes a set of such statistical methods that either address novel problems or improve existing solutions to problems in human gene mapping studies. These proposed methods are applicable to a variety of genetic studies as they address topics in linkage, linkage disequilibrium, and high-dimensional genetic analyses of complex diseases and disease-related quantitative traits.

Role: Co-investigator

Collaborators: M. Epstein (Emory University)

NIH/NCRR M01 RR00042 (Omenn), 03/01/01 – 02/28/06

General Clinical Research Center

Total: \$145,749

The major goals of this project are to review protocols and consult on biostatistical and bioinformatic aspects of investigations that use the General Clinical Research Center.

American Cancer Society RSG-02-179-MGO (Chinnaiyan), 07/01/02 – 06/30/06

Molecular Classification of Prostate Cancer

Total: \$37,792.33

The major goal of this project is to advise researchers on the design, analysis and conduct of high-throughput studies in prostate cancer involving gene and protein expression microarrays.

NIH/NHLBI P30 CA46592 (Wicha), 06/01/99 – 05/31/04

Cancer Center Support Grant (Biostatistics Core)

Total: \$69,323

The major goal of this project is to provide statistical support to University of Michigan Cancer Center researchers in the areas of design, analysis and interpretation of data.

MUNN IDEA Grant (Ghosh)

7/1/02 – 6/30/03

Total: \$20,000

The goal was to develop Bayesian and penalized regression models for the classification of tumors.

Prostate SPORE Seed Grant (Ghosh)

7/1/02 – 6/30/03

Total: \$10,000

The goal was to develop Bayesian and penalized regression models for the classification of tumors.

NIH P60 DK20572 (Herman), 12/01/02 to 11/30/07

Michigan Diabetes Research and Training Center

Total: \$ 92,498.76

The major goal of this project is to advise diabetes researchers on statistical issues related to the use of microarrays.

NIH R03 A1054406A (Zhang), 04/01/03 to 03/31/05

Library on a Chip: Bacterial Strain Microarray

Total: \$5,636

The major goal of this project is to array the genomes of a library of bacterial strains on a single chip that can be probed for the presence or absence of specific genes and for the allelic variations of the genes.

NIH P50 CA069568 (Pienta), 04/01/03 to 05/31/08

SPORE in Prostate Cancer

Total: \$45,450

The major goal of this project is to provide statistical support to University of Michigan Cancer Center researchers in the areas of design, analysis and interpretation of data in prostate cancer studies.

Books:

Tseng, G., Ghosh, D. and Zhou, X. J. (2015), Editors. *Integrating -Omics Data*. Cambridge: Cambridge University Press.

Publications which have received peer review:

† denotes a master's student advised by Ghosh, * denotes a first-authored publication by Ph.D. student or postdoc advised/co-advised by Ghosh.

1. Ghosh, D. and Godbole, A. (1997). Palindromes in random letter generation: Poisson approximations, rates of growth, and Erdős-Rényi laws. In *Proceedings of the Athens Conference on Applied Probability*, ed. C.C. Heyde *et al.*, Springer-Verlag Lecture Notes in Statistics, vol. 114, pp. 99–115.

2. Ghosh, D. and Lin, D.Y. (2000). Nonparametric analysis of recurrent events and death. *Biomet-*

rics **56**, 554–562.

3. Ghosh, D. (2000). Methods for the analysis of multiple events and death. *Controlled Clinical Trials* **21**, 115–126.
4. Ghosh, D, Deisher, T.A. and Ellsworth, J.E. (2000). Methods for the analysis of repeated measures. *Journal of Pharmacological and Toxicological Methods* **42**, 157–162.
5. Ghosh, D. (2001). Efficiency considerations in the additive hazards model with current status data. *Statistica Neerlandica* **55**, 367 – 376.
6. Sreekumar, A., Nyati, M., Barrette, T. R., Ghosh, D., Lawrence, T. and Chinnaiyan, A. M. (2001). Profiling cancer cells using protein microarrays: discovery of novel radiation-regulated proteins. *Cancer Research* **61**, 7585 – 7593.
7. Dhanasekaran, S., Barrette, T., Ghosh, D., Shah, R., Kurachi, K., Pienta, K., Rubin, M. A. and Chinnaiyan, A. M. (2001). Molecular profiling of prostate cancer: delineation of candidate biomarkers and regulatory genes. *Nature* **412**, 422 – 426.
8. Ghosh, D. (2002). Singular value decomposition regression models for the classification of tumors from microarray experiments. In *Proceedings of the 2002 Pacific Symposium on Biocomputing*, Eds. Altman, R. B. et al. pp. 18 – 29.
9. Ghosh, D. and Chinnaiyan, A. M. (2002). Mixture modelling of gene expression data from microarray experiments. *Bioinformatics* **18**, 275–286.
10. Rubin, M. A., Zhou, M., Dhanasekaran, S. M., Varambally, S., Barrette, T. R., Sanda, M. G., Pienta, K. J., Ghosh, D. and Chinnaiyan, A. M. (2002). α -methylacyl coenzyme A racemase as a tissue biomarker for prostate cancer. *Journal of the American Medical Association* **287**, 1662–1670.
11. Goldstein, D., Ghosh, D. and Conlon, E. (2002). Statistical issues in the clustering of gene expression data. *Statistica Sinica* **12**, 219–241.
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