Rebecca A. Deek

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University of Pittsburgh
Dept of Biostatistics and Health Data Science
Pittsburgh, PA 15261

rdeek@pitt.edu
rebeccadeek.github.io

Education

2018-2023	PhD in Biostatistics University of Pennsylvania, Perelman School of Medicine Advisor: Hongzhe Li Committee: Mingyao Li (Chair), Jing Huang, and Ronald G. Collman	Philadelphia, PA
2016-2018	MS in Biostatistics Columbia University, Mailman School of Public Health	New York, NY
2013-2016	BS in Biological Sciences New Jersey Institute of Technology, Albert Dorman Honors College Rutgers University	Newark, NJ

Professional appointments

2023-Present	Assistant Professor Department of Biostatistics and Health Data Science School of Public Health University of Pittsburgh	Pittsburgh, PA
2018-2023	Research Assistant Department of Biostatistics, Epidemiology, & Informatics Perelman School of Medicine University of Pennsylvania	Philadelphia, PA
2017-2018	Research Assistant Department of Natural Sciences School of Arts and Sciences Lebanese American University	Byblos, LB

Honors & awards

2022	Best Poster Award Penn Conference on Big Data in Biomedical and Population Health Sciences
2016-2018	Hu Family Scholarship Columbia University
2016	President's Medal for Academic Excellence New Jersey Institute of Technology
2016	Outstanding Honors Research Award NJIT Albert Dorman Honors College
2015	Leadership Service Award NJIT Albert Dorman Honors College

2013-2016   Full Merit Scholarship
             NJIT Albert Dorman Honors College

Funding

Publications

† Equal contribution
* Corresponding/senior author
_ Advisee/mentee

REFEREED ARTICLES

1. Yan B, Nam Y, Li L, **Deek RA**, Li H, & Ma S. (2025). Recent advances in deep learning and language models for studying the microbiome. *Frontiers in genetics*, *15*, 1494474.

2. Duan H, Ren J, Wei S, Yang Z, Li C, Wang Z, Li M, Wei Z, Liu Y, Wang X, et al. (2024). Integrated analyses of multi-omic data derived from paired primary lung cancer and brain metastasis reveal the metabolic vulnerability as a novel therapeutic target. *Genome medicine*, *16*(1), 138.

3. Little A, **Deek RA**, Zhang A, Zhao N, Ling W, & Wu MC. (2024). Enhanced visualization of microbiome data in repeated measures designs. *Frontiers in Genetics*, *15*, 1480972.

4. Wang T, Kim J, Kumar R, **Deek RA**, Stephenson R, Mayer T, Saraiya B, Ghodoussipour S, Jang T, Golombos D, et al. (2024). Landscape and prognostic significance of oncogene drivers in metastatic castration sensitive prostate cancer. *Translational Cancer Research*, *13*(11), 6235.

5. Sutera P, Kim J, Kumar R, **Deek RA**, Stephenson R, Mayer T, Saraiya B, Ghodoussipour S, Jang T, Golombos D, et al. (2024a). Pik3/akt/mtor pathway alterations in metastatic castration-sensitive prostate cancer. *The Prostate*, *84*(14), 1301–1308.

6. Sutera P†, Deek MP†, **Deek RA**, Guler OC, Hurmuz P, Reyhan M, Rowe S, Radwan N, Dipasquale S, Hrinivich WT, et al. (2024b). Prostate-specific membrane antigen pet response associates with metastasis-free survival after stereotactic ablative radiation in oligometastatic prostate cancer. *Advances in Radiation Oncology*, *9*(7), 101507.

7. Deek AJ, **Deek RA**, Clegg DJ, Blackburn C, Holley T, & Gotcher JE. (2024a). To what extent do oral and maxillofacial surgery residents suffer from imposter syndrome? *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, *138*(1), 21–27.

8. **Deek RA**, Ma S, Lewis J, & Li H. (2024b). Statistical and computational methods for integrating microbiome, host genomics, and metabolomics data. *Elife*, *13*, e88956.

9. Deek AJ, Clegg DJ, **Deek RA**, Blackburn C, Scott CA, Holley T, & Gotcher JE. (2024c). Risk factors for pediatric facial trauma in an appalachian region: An epidemiological review at a single institution. *Journal of Oral and Maxillofacial Surgery*, *82*(3), 306–313.

10. Khullar K, **Deek RA**, Nelson B, Gaines D, Corrigan KL, LeCompte MC, Deville Jr C, Deek MP, & Jabbour SK. (2024). Gender and the receipt of the association of residents in radiation oncology educator of the year award. *Advances in radiation oncology*, *9*(1), 101305.

11. **Deek RA**, & Li H. (2023). Inference of microbial covariation networks using copula models with mixture margins. *Bioinformatics*, *39*(7), btad413.

12. McGinniss JE, Whiteside SA, **Deek RA**, Simon-Soro A, Graham-Wooten J, Oyster M, Brown MD, Cantu E, Diamond JM, Li H, et al. (2022). The lung allograft microbiome associates with pepsin, inflammation, and primary graft dysfunction. *American journal of respiratory and critical care medicine*, *206*(12), 1508–1521.

13. Deek MP[†], Van der Eecken K[†], Sutera P, **Deek RA**, Fonteyne V, Mendes AA, Decaestecker K, Kiess AP, Lumen N, Phillips R, et al. (2022). Long-term outcomes and genetic predictors of response to metastasis-directed therapy versus observation in oligometastatic prostate cancer: Analysis of stomp and oriole trials. *Journal of clinical oncology*, *40*(29), 3377–3382.

14. Wei S, Yin D, Yu S, Lin X, Savani MR, Du K, Ku Y, Wu D, Li S, Liu H, et al. (2022). Antitumor activity of a mitochondrial-targeted hsp90 inhibitor in gliomas. *Clinical Cancer Research*, *28*(10), 2180–2195.

15. **Deek RA**, & Li H. (2021). A zero-inflated latent dirichlet allocation model for microbiome studies. *Frontiers in Genetics*, *11*, 602594.

16. **Deek R**[†], Nasser J[†], Ghanem A[†], Mardelli M[†], Khazen G, Salloum AK, Abchee A, Ghassibe-Sabbagh M, & Zalloua P. (2019). Genome-wide association analysis of hdl-c in a lebanese cohort. *PLoS One*, *14*(6), e0218443.

17. Chen J[†], King E[†], **Deek R**[†], Wei Z, Yu Y, Grill D, & Ballman K. (2018). An omnibus test for differential distribution analysis of microbiome sequencing data. *Bioinformatics*, *34*(4), 643–651.

Published proceedings and columns

1. Tommarello ND and **Deek RA**. (2024). The Convergence of the Internet of Things and Artificial Intelligence in Medicine: Assessing the Benefits, Challenges, and Risks. Computer, 57(2), 95-99.

2. **Deek R**. (2015). Lessons From Nature: Defensive Designs for the Built Environment. In 5th International Conference on Building Resilience.

Under review and preprints

1. Krsmanovic G, **Deek RA***, Deek FP*. The Development and Maintenance of Thinking Processes and Learning Abilities in the Era of Artificial Intelligence. *Accepted in IEEE Computer*.

2. Sehrawat A, Zeng X, Abrahamson EE, **Deek RA**, Gogola A, Kamboh MI, Pascoal TA, Villemagne VL, Ganguli M, Lopez OL, Ikonomovic MD, Snitz BE, Cohen AD, Karikari TK. Plasma p-tau217: accuracies for autosomal dominant and sporadic Alzheimer's disease in the community. *Accepted in Alzheimer's & Dementia*.

3. Carlson KM, Abdul-Rahman NH, **Deek RA**, Cenname A, Cai W, Demanelis K, Zandberg DP, Contrera K, Zevallos JP, Martinson J, Mazul AL. Disparities and trends in HPV pathologic testing among oropharyngeal cancer patients, 2013-2021. Under revision.

4. **Deek RA**[†], Xue F[†], Lewis JD, Li H. Estimation and false discovery control of multivariate causal effects in omics studies. Under review.

5. Zang C, **Deek RA***, Tang L*. Supervised matrix factorization for estimating individualized treatment rule: Incorporating medical notes in decision making. Under review.

6. Schweitzer N, Shen Y, Zhao Y, Cover CG, Alam MS, **Deek RA**, Aizenstein HJ, Wu M, Koldamova R, Vazquez AL, Fitz NF, Iordanova B. Linking trajectories of cerebrovascular remodeling and dysfunction to cross-species brain vessel transcriptome in Alzheimer's disease. Under review.

7. Grizzanti J, Zhang Y, **Deek RA**, Lafferty TK, Jacobsen E, Bellaver B, Ferreira PCL, Zeng X, Chang CH, Pascoal TA, Snitz BE, Villemagne VL, Ganguli M, Karikari TK. Sex-dependent association between diabetes status and Alzheimer's disease plasma biomarkers in a population-based cohort. Under review.

8. Sun J, Fan Z, Sriram A, **Deek RA**, Kim S, Park HJ. Unveiling the gut microbiome network fingerprint: A deep learning approach to predict immunotherapy response in melanoma patients. Under revision.

9. Whiteside SA, McGinniss JE, **Deek RA**, Merenstein C, Britton N, Simon-Soro A, Oyster M, Kalman L, Brown MC, Graham-Wooten J, McDyer JF, Shah P, D'Alessio F, Cantu E, Clausen E, Li H, Diamond JM, Bushman FD, Christie JD, RG Collman. Low bacterial burden and hypo-inflammatory profile in lung during the first year post-lung transplant for cystic fibrosis associates with subsequent CLAD. Under review.

10. **Deek RA**, Kim J, Kumar R, Medina B, Langenfeld J, Kontopidis I, Lazzaro R, Nie K,Hathout L, Guler O, Onal C, Patel E, Haigentz M, Jabbour S, Deek MP. Clinical and genomic features and prognostic biomarkers of oligometastatic non-small cell lung cancer. Under review.

11. Kim J, Kumar R, Zhang Y, Eranki S, Oh S, **Deek RA**, Mattes M, Hathout L, Ecker B, Grandhi M, Langan R, Berim L, Gulhati P, Eskander M, Kennedy T, August D, Hochster H, In H, Boland P, Jabbour SK, Deek MP. The Clinical and genomic landscape of TP53 mutated metastatic pancreatic adenocarcinoma. Under review.

12. Zhao FR, **Deek RA**, Garifallou J, Jalaly J, Lin C, Reed D, Banerjee S, Amudala N, Sreih A, Chou S, Livolsi V, Collman R, Lee H, Merkel P, Grayson P, Cohen N, Miner J, Rhee R. Changes in nasal epithelial gene expression are present months prior to systemic relapse in granulomatosis with polyangiitis. Under review.

13. **Deek RA** and Li H. Mixture margin random-effects copula models for inferring temporally conserved microbial covariation networks from longitudinal data. Under revision.

Software

1. CoMiCoN: An R package for two-stage inference and network analysis of bivariate mixture margin copula models. Creator and core developer.

2. zinLDA: An R package for MCMC implementation of zero-inflated latent Dirichlet allocation models for microbiome studies. Creator and core developer.

Presentations

Invited presentations

1. CMStatistics 2025. London, United Kingdom. December 2025.

2. *Benchmarking and improving statistical methods for microbiome multiomics integration.* BIRS Workshop on Novel Statistical Approaches for Studying Multi-omics Data. Banff, Canada. July 2025.

3. *Supervised dimensionality reduction and visualization of microbiome data.* ENAR 2025. New Orleans, LA, USA. March 2025.

4. *Joint estimation and false discovery control of causal effects in metabolomics randomized trials.* CMStatistics 2024. London, United Kingdom. December 2024.

5. *A copula model framework for estimating microbial covariation networks.* JSM 2024. Portland, OR, USA. August 2024.

6. *Estimating temporally conserved microbial covariation networks from longitudinal data.* STAT-GEN 2024. Pittsburgh, PA, USA. May 2024.

7. *Statistical and computational methods for integrating microbiome and host omics data.* CMStatistics 2023. Berlin, Germany. December 2023.

8. *Statistical and computational methods for integrating microbiome and host omics data.* Women in Statistics and Data Science 2023. Bellevue, WA, USA. October 2023.

9. *Statistical and computational methods for integrating microbiome and host omics data.* JSM 2023. Toronto, ON, Canada. August 2023.

10. *Microbial covariation discovery using mixture margin copula models.* IMS 2022. London, UK. June 2022.

11. *Methods for inference of microbial interactions using copula models with mixture margins.* JSM 2020. Philadelphia, PA, USA (Virtual due to COVID-19). August 2020.

INVITED SEMINARS

1. *Modeling complex dependency and network structures in zero-inflated metagenomic sequencing data.* Institute for Healthcare Delivery Science Seminar. Icahn School of Medicine at Mount Sinai. New York, NY, USA. November 2024.

2. *Mixture margin copula models for inferring covariation networks with applications in metagenomics.* Department of Statistics Seminar. University of Pittsburgh. Pittsburgh, PA, USA. September 2024.

3. *Advances in statistical methods for metagenomic sequencing data analysis.* Basic and Translational Research in Lung Diseases Conference. Department of Medicine. University of Pittsburgh. Pittsburgh, PA, USA. April 2024.

4. *Advances in statistical methods for metagenomic sequencing data analysis.* Department of Orthopedics Seminar. University of Pittsburgh. Pittsburgh, PA, USA. March 2024.

5. *Inferring microbial cooccurrence from sequencing data.* NIEHS BCBB Seminar. Research Triangle, NC, USA (Virtual). April 2022.

CONTRIBUTED PRESENTATIONS

1. *Statistical and computational approaches for estimating microbial covariation networks.* Rust Belt Microbiome 2024. Pittsburgh, PA, USA. November 2024.

2. *Head-to-head comparison of four different plasma p-tau217 assays to detect brain amyloid pathology and cognitive decline in diverse population-based cohorts.* AAIC 2024. Philadelphia, PA, USA. August 2024.

3. *Inference for conserved microbial covariations using mixture margin random-effects copula models.* Penn Conference on Big Data in Biomedical and Population Health Sciences. Philadelphia, PA, USA. September 2022. (Best Poster Award).

4. *Statistical methods for microbiome driven integration of omics data.* ENAR 2023. Nashville, TN, USA. March 2023.

5. *Mixture margin random-effects copula models for conserved microbial covariations.* JSM 2022. Washington, DC, USA. August 2022.

6. *Inference for temporally conserved microbial interactions using mixture margin copulas.* ENAR 2022. Houston, TX, USA. March 2022.

7. *Copula models for temporally conserved microbial interactions.* JSM 2021. Seattle, WA, USA (Virtual due to COVID-19). August 2021.

8. *Mixed margin copula models for microbial interactions.* ENAR 2021. Baltimore, MD, USA (Virtual due to COVID-19). March 2021.

9. *Zero-inflated topic models for the analysis of microbiome data.* ENAR 2020. Nashville, TN, USA. (Virtual due to COVID-19). March 2020.

Teaching

Fall 2025 BIOST 2143: Longitudinal and Clustered Data Analysis (3 credits)
Fall 2024
- 2024: 37 enrolled

Spring 2024 BIOST 2025: Biostatistics Seminar (1 credit)
Fall 2023
- 2024: 22 enrolled
- 2023: 17 enrolled

University of Pennsylvania

Teaching assistant

Fall 2020 BSTA 630: Statistical Methods and Data Analysis I
Spring 2020 BIOM 611: Statistical Methods for the Design and Analysis of Experiments

Columbia University

Teaching assistant

Fall 2017 P8130: Biostatistical Methods I

Other teaching

Spring 2018 P8180: Relational Databases & SQL Programming for Research & Data Science (Curriculum developer)

Advising

Doctoral dissertation advising

2025-Present 1. Tianshu Liu, PhD in Biostatistics, University of Pittsburgh
2024-Present 2. Crystal Zang, PhD in Biostatistics, University of Pittsburgh (Co-advised with Lu Tang)

Master's thesis advising

2024-2025 1. Nicholas Heaton, MS in Biostatistics, University of Pittsburgh
First position: Statistician, University of Michigan

Other advising

2024-2025 1. Gala Krsmanovic, BS in Cyberpsychology, New Jersey Institute of Technology
2024-2025 2. Arsia Jamali, Gastroenterology Fellow, University of Pennsylvania
2024 3. Nina Tommarello, High school student

Doctoral dissertation committee served

2025-Present 1. Penghui Huang, PhD in Biostatistics, University of Pittsburgh
2025-Present 2. Xinliei Chen, PhD in Biostatistics, University of Pittsburgh
2025-Present 3. Rick Chang, PhD in Biostatistics, University of Pittsburgh
2024-Present 4. Emma Gay, PhD in Epidemiology, University of Pittsburgh
2024-Present 5. Jie Sun, PhD in Human Genetics, University of Pittsburgh
2024-2025 6. Wenjia Wang, PhD in Biostatistics, University of Pittsburgh
2023-Present 7. Preeti Bhanap, PhD in Computational Biology, University of Pennsylvania

Master's thesis committee served

2024-2025	1. Haoling Wang, MS in Biostatistics, University of Pittsburgh
2024-2025	2. Aparna Nigam, MS in Biostatistics, University of Pittsburgh
2024-2025	3. Samantha Pokorny, MS/MPH in Human Genetics, University of Pittsburgh

GSR advisor

2025-Present	1. Crystal Zang (PhD GSR), University of Pittsburgh
2024-Present	2. Tianshu Liu (PhD GSR), University of Pittsburgh
2024-Present	3. Kangyi Zhao (PhD GSR), University of Pittsburgh
2024-2025	4. Nicholas Heaton (MS hourly), University of Pittsburgh

Academic advisor

2025-2026	1. Crystal Zang, PhD in Biostatistics, University of Pittsburgh
2024-Present	2. Tianshu Liu, PhD in Biostatistics, University of Pittsburgh
2024-Present	3. Ishta Madan, MS in Biostatistics, University of Pittsburgh
2024-2025	4. Nicholas Heaton, MS in Biostatistics, University of Pittsburgh

Professional service

Editorial service

Paper referee: Annals of Applied Statistics, Annals of Epidemiology, Bioinformatics, Biometrics, BMC Medical Research Methodology, JAMA Oncology, Journal of the American Statistical Association (JASA), Methods in Ecology and Evolution, Scientific Reports, Statistics Sinica

Departmental, school, and university service

2025	Judge, Biostatistics Research Day
2024-Present	Member, Biostatistics MS Program Committee
2024-Present	Member, Biostatistics PhD Qualifying Exam Committee
2024-Present	Reviewer, Psychiatry Research Review Committee
2024	Judge, Biostatistics Research Day
2024	Organizer, Biostatistics Research Day
2023-Present	Member, Outreach and Community Engagement Committee

Memberships

2021-Present	Institute of Mathematical Statistics
2019-Present	American Statistical Association
2019-Present	Eastern North American Region International Biometric Society (ENAR IBS)

Committee appointments

2024-Present	Secretary, ASA Section on Statistics in Genomics and Genetics
2023-2024	Local organizing committee, STATGEN 2024, ASA Section on Statistics in Genomics and Genetics

Conference service

2025   Invited session organizer, ENAR 2025
2024   Student paper competition reviewer, ENAR 2025
2024   Session moderator, Rust Belt Microbiome 2024
2024   Invited session organizer and chair, STATGEN 2024 ASA SSGG

Other service

2024   Mentor, NJIT Women with STEAM Mentoring