

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health

Zhenke Wu, assistant professor of biostatistics, School of Public Health, is recommended for promotion to associate professor of biostatistics, with tenure, School of Public Health

Academic Degrees:

Ph.D.	2014	Johns Hopkins University, Baltimore, MD
B.Sc.	2009	Fudan University, Shanghai, China

Professional Record:

2018 - Present	Member, Institute for Health Policy Innovation, University of Michigan, Ann Arbor, MI
2017 - Present	Faculty Associate, Quantitative Methodology Program, Survey Research Center, Institute for Social Research, University of Michigan, Ann Arbor, MI
2016 - Present	Assistant Professor, Department of Biostatistics, School of Public Health, Ann Arbor, MI
2016 - Present	Faculty Affiliate, Michigan Institute for Data Science, University of Michigan, Ann Arbor, MI
2014 - 2016	Post-doctoral Fellow, Hopkins Individualized Health, Johns Hopkins University, Baltimore, MD
2014 – 2016	Post-doctoral Fellow, Department of Biostatistics, School of Public Health, Johns Hopkins University, Baltimore, MD

Summary of Evaluation:

Teaching: Professor Wu has taught one or two classes per academic year, mostly at the master's level. In his first year at the University of Michigan, he developed and taught a new advanced topics course, BIOSTAT 830: Graphical Models. For the past several years he has taught BIOSTAT 653: Theory and Applications of Longitudinal Analysis, a core course in both the biostatistics master's and Ph.D. programs. His teaching scores (Q1 and Q2) are generally in the low 4s, but increased to 4.7 and 4.8 in the last year.

Professor Wu has mentored an unusually large number of doctoral students both within and outside of the Department of Biostatistics. He has been the chair or co-chair for seven doctoral students, four of whom have won awards for their research at statistical conferences. In addition, he has been on the committee for another 26 doctoral students. Professor Wu has funded and supervised 10 students as part of Graduate Student Research Assistantships. He is also active in mentoring undergraduate students as an instructor and research mentor at the UM's Big Data Summer Institute. This is a substantial level of mentoring for an assistant professor.

Research: Professor Wu works at the intersection of statistics, data science, and biomedical applications. He is known as a leading expert in Bayesian latent class analysis, which is an important statistical method for grouping subjects by risk group for interventions. His methods

are deemed more interpretable than prior methods that did not include knowledge about the relationship among variables. His latent class methods have been applied to many public health problems such as tracking transmission of extraintestinal *E. coli* infections and pediatric pneumonia. He is an expert in the design and analysis of intervention studies using data from mobile devices. Professor Wu combines his knowledge of study design, causal inference, and longitudinal data analysis to the field of digital health. Two important themes are evident in Professor Wu's research. The first theme is the connection between theory and applications. His theoretical research has already been used to understand and address public health problems. He is motivated to solve practical statistical problems by bringing rigorous theory to those important problems. The second theme is his willingness to make user-friendly software (in R) freely available to other researchers. This translation helps disseminate his ideas and methods. To date, he has shared nine software packages with the broader research community.

Professor Wu has published 35 papers since joining the University of Michigan in 2016. He was the first or senior author on 10 of these papers. Many of these papers are published in the leading statistics and biostatistics journals, such as *Biometrika*, *Biometrics*, *Biostatistics*, *Statistics in Medicine*, and *Annals of Applied Statistics*. According to Google Scholar, he has 1,626 citations and an h-index of 20. He has another dozen papers currently under review. Professor Wu has been well funded from both internal and external sources. Internally, he is currently the sole principal investigator (PI) on both a University of Michigan Precision Health Award and a Propelling Original Data Science Grant from Michigan Institute for Data Science (MIDAS). In terms of extramural funding, he has been the subcontract site PI four times, and a co-investigator on nine National Institutes of Health (NIH) grants and one Patient-Centered Outcomes Research Institute Phased Large Awards for Comparative Effectiveness Research grant.

Recent and Significant Publications:

- Li, M., Park, D.E., Aziz, M., Liu, C.M., Price, L.B., Wu, Z. (2021) Integrating sample similarities into latent class analysis: a tree-structured shrinkage approach. *Biometrics*. Oct 18. doi: 10.1111/biom.13580. Epub ahead of print. PMID: 34658017.
- Wu, Z., Chen, I. (2021) Probabilistic cause-of-disease assignment using case-control diagnostic tests: A latent variable regression approach. *Stat Med*. Feb 20;40(4):823-841. doi: 10.1002/sim.8804. Epub 2020 Nov 6. PMID: 33159360.
- Wu, Z., Casciola-Rosen, L., Rosen, A., Zeger, S.L. (2021) A Bayesian approach to restricted latent class models for scientifically structured clustering of multivariate binary outcomes. *Biometrics*. Dec;77(4):1431-1444. doi: 10.1111/biom.13388. Epub 2020 Oct 28. PMID: 33031597.
- NeCamp, T., Sen, S., Frank, E., Walton, M.A., Ionides, E.L., Fang, Y., Tewari, A., Wu, Z. (2020) Assessing Real-Time Moderation for Developing Adaptive Mobile Health Interventions for Medical Interns: Micro-Randomized Trial. *J Med Internet Res*. Mar 31;22(3):e15033. doi: 10.2196/15033. PMID: 32229469; PMCID: PMC7157494.
- Wu, Z., Casciola-Rosen, L., Shah, A.A., Rosen, A., Zeger, S.L. (2019) Estimating autoantibody signatures to detect autoimmune disease patient subsets. *Biostatistics*. Jan 1;20(1):30-47. doi: 10.1093/biostatistics/kxx061. PMID: 29140482; PMCID: PMC6657300.

Service: Internally, Professor Wu's service contributions include being a member of the School of Public Health's Junior Faculty Advisory Board, member of the Eisenberg Family Depression Center Faculty Search Committee, and serving as a grant reviewer for MIDAS, Michigan Medicine, UM Precision Health, and MICHHR. He has also served as the co-chair of the department's seminar committee and has helped to organize two conferences for MIDAS. In terms of service to the profession, Professor Wu has served in a variety of leadership roles for major conferences including as session organizer, session chair, and discussant. Professor Wu regularly reviews papers for many professional journals including *Biometrics*, *Statistics in Medicine*, *Annals of Applied Statistics*, *International Journal of Epidemiology*, and *Epidemiology*. He was appointed as a member of the Regional Advisory Board for the International Biometric Society. In this role he advises on policy, new initiatives, and on the appointment of committees. Beyond his numerous service roles to the profession, as mentioned previously, Professor Wu provides service by making R statistical code broadly available to other researchers.

External Reviewers:

Reviewer A: "Dr. Wu has made substantial contributions in field of Bayesian methodology through the development of novel statistical modeling techniques motivated by applications in biomedical and public health sciences. Dr. Wu has established himself as a nationally recognized expert in latent class analysis. Given Dr. Wu's excellence in research, and very good in teaching and service, he would meet the requirements for promotion and tenure at my institution."

Reviewer B: "Dr. Wu's methodological research has yielded multiple significant, impactful contributions to statistical science and biomedical research more generally. I am confident that Dr. Wu would be promoted to associate professor if he were to go up for promotion in my department."

Reviewer C: "Dr. Wu's work made a major contribution to restricted latent class model by allowing unknown number of classes and unknown set of state patterns. Their approach is highly innovative and likely to become a very useful tool for practitioners in precision medicine research. I can speak without hesitation that someone with Dr. Wu's track record would be promoted to an Associate Professor at [my institution]."

Reviewer D: "He has made some nice contributions in an important area with interesting methodological challenges. Based on his CV, his contributions to professional service at Michigan and more broadly have been quite strong for an assistant professor."

Reviewer E: "Zhenke's body of work on Bayesian latent class models with multivariate outcomes is of high quality: the methods development in a series of papers is solid and comprehensive; the proposed models are well grounded in real applications, and are potentially applicable to many problems in etiology research. I believe Zhenke meets the tenure requirements at most Biostatistics departments in U.S., and certainly at [my institution]."

Reviewer F: "Dr. Wu has established himself as a recognized research leader and innovator in statistical methods for precision therapy with impactful publications in statistics and scientific

area literature, an effective educator and mentor, and a willing contributor to professional and institutional service. I am confident that he would be promoted to associate professor with tenure at any of the leading Biostatistics departments, and recommend his promotion with tenure without reservation.”

Reviewer G: “His collection of work on Bayesian inference for latent class analysis is creative, taking advantage of multiple streams of data and linking results within a hierarchical structure. I’m sure he would be promoted in my home department and in the other departments of biostatistics with which I am familiar.”

Summary of Recommendation: Professor Wu has an excellent record in research as an expert in Bayesian latent class analysis. He has an excellent record in teaching, particularly student mentorship, as well as service. It is with the support of the School of Public Health Executive Committee that I recommend Zhenke Wu for promotion to associate professor of biostatistics, with tenure, School of Public Health.



F. DuBois Bowman, Ph.D.
Dean, School of Public Health

May 2023