

PROMOTION RECOMMENDATION  
The University of Michigan  
School of Public Health

Xiang Zhou, associate professor of biostatistics, with tenure, School of Public Health, is recommended for promotion to professor of biostatistics, with tenure, School of Public Health.

Academic Degrees:

Ph.D.	2010	Duke University, Durham, NC
M.S.	2009	Duke University, Durham, NC
B.S.	2004	Peking University, Beijing, China

Professional Record:

2021 - Present	Assistant Director for Data, Analytics, and IT Workgroup, Precision Health Initiative, University of Michigan, Ann Arbor, MI
2019 - Present	Associate Professor, Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, MI
2018 - 2019	John G. Searle Assistant Professor, Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, MI
2014 - 2018	Assistant Professor, Department of Biostatistics, School of Public Health, University of Michigan, Ann Arbor, MI
2013 - 2014	William H. Kruskal Instructor, Department of Statistics, University of Chicago, Chicago, IL
2010 - 2013	Post-doctoral Scholar, Department of Human Genetics, University of Chicago, Chicago, IL

Summary of Evaluation:

Teaching: Since being promoted to associate professor, Professor Zhou has taught three graduate courses: two in Fall 2019, BIOSTAT 523 “Statistical Methods for Epidemiology” and BIOSTAT 682 “Applied Bayesian Inference,” and one in Fall 2021, BIOSTAT 501 “Introduction to Biostatistics,” a large service course. Due to his sabbatical leave during the F20-W21 academic year, he had no teaching during that year. Of the three courses he taught, his evaluation scores across all questions ranged from 3.8 to 5.0 with the vast preponderance at 4.0 or higher. He has shown evidence of teaching innovation in his courses having employed a flipped classroom design in BIOSTAT 501 and changed the content of BIOSTAT 682 to emphasize the philosophical view of Bayesian analysis and its foundational difference from frequentist approaches.

Professor Zhou is currently advising three post-doctoral fellows and advising or co-advising nine Ph.D. students in the Department of Biostatistics. He is currently serving as a member on the thesis committee for another nine Ph.D. students across the university. Since 2019, Professor Zhou has served as advisor or co-advisor for four students who have graduated. In addition, six post-doctoral fellows have completed their training with Professor Zhou since 2019.

Research: Professor Zhou is an internationally known statistical geneticist who focuses on developing statistical and computational methods for genomic studies. He has developed novel analytic methods and fast, robust algorithms to efficiently extract information from high-dimensional heterogeneous omics data which has helped advance the understanding of the genetic basis of phenotypic variation for human diseases and disease-related quantitative traits. Professor Zhou’s

scholarly publications tackle a wide variety of cutting-edge problems. He has published methods papers on some of the most important contemporary topics in the fields of genetics and genomics. He has extensive collaborations with colleagues both at Michigan and externally.

Professor Zhou has published 115 peer-reviewed publications and is the first or senior author for 55 of them. Among the 115 publications, 75 have been published since 2019. Professor Zhou's publications have been cited 7,715 times with an h-index of 40 and i10-index of 78. One of his first-authored papers published in *Nature Genetics* (2012) received 2,203 citations, demonstrating its broad impact. Professor Zhou's work has been published in both prestigious scientific journals, such as *Nature*, *Science*, *Nature Methods*, *Nature Genetics*, *Genome Biology*, *American Journal of Human Genetics*, *PLOS Genetics*, and *Nature Communications*, and leading statistical journals, such as *Annals of Applied Statistics* and *Biometrics*. Since 2019, he has been invited to deliver 30 seminars at departmental seminar series and national and international conferences. Professor Zhou's unique bench scientist training background has enabled him to work closely with wet-lab biologists on several projects as the lead biostatistician. In his current rank, he has obtained two National Institutes of Health (NIH) R01 grants as the principal investigator (PI), three NIH grants as a co-PI/multiple PI (two R01s and one core UC2), and he has seven active NIH grants as a co-investigator. This level of extramural PI funding in biostatistics is remarkable for a faculty member who is just 12 years post Ph.D.

#### Recent and Significant Publications:

- Yang, S., Zhou, X. (2020) Accurate and Scalable Construction of Polygenic Scores in Large Biobank Data Sets. *Am J Hum Genet.* May 7;106(5):679-693. doi: 10.1016/j.ajhg.2020.03.013. Epub Apr 23. PMID: 32330416; PMCID: PMC7212266.
- Sun, S., Zhu, J., Zhou, X. (2020) Statistical analysis of spatial expression patterns for spatially resolved transcriptomic studies. *Nat Methods.* 2020 Feb;17(2):193-200. doi: 10.1038/s41592-019-0701-7. Epub Jan 27. PMID: 31988518; PMCID: PMC7233129.
- Zhu, J., Sun, S., Zhou, X. (2021) SPARK-X: non-parametric modeling enables scalable and robust detection of spatial expression patterns for large spatial transcriptomic studies. *Genome Biol.* Jun 21;22(1):184. doi: 10.1186/s13059-021-02404-0. PMID: 34154649; PMCID: PMC8218388.
- Yuan, Z., Liu, L., Guo, P., Yan, R., Xue, F., Zhou, X. (2022) Likelihood-based Mendelian randomization analysis with automated instrument selection and horizontal pleiotropic modeling. *Sci Adv.* Mar 4;8(9):eabl5744. doi: 10.1126/sciadv.abl5744. Epub 2022 Mar 2. PMID: 35235357; PMCID: PMC8890724.
- Ma, Y., Zhou, X. (2022) Spatially informed cell-type deconvolution for spatial transcriptomics. *Nat Biotechnol.* Sep;40(9):1349-1359. doi: 10.1038/s41587-022-01273-7. Epub 2022 May 2. PMID: 35501392; PMCID: PMC9464662.

Service: Professor Zhou served as the chair of the department faculty search committee during 2021-2022 and as a member of several department committees while in rank. Since 2021, he has served as the assistant director for the Data, Analytics and Information Technology Workgroup in the Precision Health Initiative at the University of Michigan. He now serves on the internal advisory board for the University of Michigan Biosciences Initiative funded Single Cell Spatial Analysis Program (SCSAP), overseeing faculty recruitment and other activities sponsored by the program. Professor Zhou has served as a guest editor for *PLOS Genetics* and *PLOS Computational Biology*. He has been serving as the chair of the Student Paper Award Committee for the International Conference on Software Architecture 2023 Applied Statistics Symposium that will be held in Ann Arbor in June 2023. Professor Zhou is an associate editor of *Annals of Applied Statistics* and the program chair-elect for the American Statistical Association (ASA) Statistics in Genomics and Genetics Section.

He has served as referee for many leading science and statistical journals. He has also served as an external thesis examiner of Ph.D. dissertations from the University of Melbourne and Yale University and served as an ad hoc member on three NIH grant review panels and a United Kingdom Medical Research Council panel.

External Reviewers:

Reviewer A: “The productivity of Dr. Zhou in the last 5 years is simply dizzying! He has been consistently and voluminously publishing in some of the most top-rated journals in the genomics and genetics field, such as *Nature Biotechnology*, *Nature Methods*, *Genome Biology* and the *American Journal of Human Genetics*. He is tackling a wide variety of cutting-edge problems...In summary, Dr. Zhou has been firing on all the cylinders of research scholarship, teaching and services. He is rapidly accelerating and at this pace, I predict that, in five years from now, he is going to be well established as one of the top leaders of the computational genetics and genomics field. If he was at our department, it will be a no-brainer to put him for an early promotion to Professorship with tenure. He is at par with some of our early-to-mid career superstars like Hongkai Ji or Jeff Leek in terms of research accomplishments. I give him my highest recommendations for this promotion.”

Reviewer B: “Xiang has been incredibly productive and impactful, with consistent high-quality publications. His training in both wet lab biology and statistical science is quite unique and it is this interdisciplinary training that allows him to propose principled and practically useful statistical approaches for important problems in genomics. Xiang is the complete package – his publication and funding records are outstanding and he supervises an impressive number of 13 students and postdocs. He would certainly have no problem being promoted in my department; he would be a star faculty! ... I strongly believe that he is among the most influential statistical geneticists, and would be a great asset to any top university.”

Reviewer C: “Xiang undoubtedly hit all important benchmarks that demonstrate scholarly excellence by now. He has an outstanding publication record, with a very nice mix of innovative methodology and collaborative papers, including manuscripts in the best academic journals (for example, Xiang published senior-authored manuscripts this year alone in *Nature Biotechnology*, *Genome Biology*, the *American Journal of Human Genetics*, *Science Advances*, and *Nucleic Acids Research*). Since 2019 he has published over 30 manuscripts as the corresponding senior author, many of those with a mentee as first author, an obvious indicator of his leadership. He is currently pushing the envelope by publishing methods on some of the most important contemporary topics in our field. ... Dr. Xiang Zhou is an amazingly productive researcher and mentor, and a leader in our field. I gladly and enthusiastically endorse his promotion to the rank of Professor with tenure at the University of Michigan...there is no doubt in my mind that Xiang would be promoted to the rank of Professor with tenure here.”

Reviewer D: “Put simply, Dr. Zhou is a star in the field of statistical genetics. His promotion materials far exceed the expectations commensurate with promotion to the rank of Professor with Term Tenure at [my institution]... He is a gem of your faculty and further elevates an already well reputed group in the Department of Biostatistics and in your School of Public Health. I give you my whole-hearted endorsement of his promotion. ...Dr. Zhou has been innovative and broad in the work reflected in his publications, many of which are of remarkably high impact, particularly for methods development. He has worked across the central dogma of biology, with computational methods for ‘omic data from DNA, RNA and proteins. He has applied varied statistical techniques to these problems; he is not a ‘one tool’ statistician. Finally, he has demonstrated a sincere passion for mentoring and education. By all measures he is an exemplary statistician and colleague in the Dept.

of Biostatistics. ...I cannot give Dr. Zhou a stronger recommendation to appointment as Professor at your prestigious institution.”

Reviewer E: “Given the quality, quantity, focus and impact of Dr. Zhou’s research, I would consider Dr. Zhou to be the best in his peer group cohort. His contributions far exceed the normative standard, and I cannot think of any others in his cohort who come close. ...I have been particularly impressed by his 2012 *Nature Genetics* article focused on mixed-model association testing. This paper made feasible an entire class of statistical models that could allow for efficient and powerful gene mapping in the presence of population effects. It has been cited over 2000 times which is particularly noteworthy for methodological research papers. ...In conclusion, Dr. Zhou is a fantastic researcher and faculty member who is easily deserving of promotion to professor with tenure. If his case were to appear at my institution, I am absolutely confident that he would be promoted, with neither need for discussion nor any dissent.”

Reviewer F: “I am writing, with strongest enthusiasm, in support of the promotion of Dr. Xiang Zhou to the rank of full professor with tenure in the Department of Biostatistics in the School of Public Health at the University of Michigan. I view Dr. Xiang as one of the leading researchers in the field of Statistical Genetics and Genomics today, and his contributions in methodological and collaborative research in biomedicine, as well as his stellar teaching and service record, makes him deserving of this promotion. ...Dr. Zhou is an internationally recognized leader on both methodologic development and applied data analysis in the fields of genetics and genomics. Dr. Zhou has developed several impactful statistical methods in these fields that have become standards of the field, widely used across the discipline. ...In summary, Dr. Zhou is an outstanding statistician, biologist, teacher, and mentor. His accomplishments are truly impressive for being only 12 years from his Ph.D., and I believe his record of research, collaboration, teaching, and mentoring surely warrants the promotion to Full Professor.”

Summary of Recommendation: Professor Zhou has an excellent record in the field of statistical methods and computational tools for genetic and genomic studies. He has a very good record in teaching and an excellent record in service. It is with the support of the School of Public Health Executive Committee that I recommend Xiang Zhou for promotion to professor of biostatistics, with tenure, School of Public Health.



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

May 2023