

PROMOTION RECOMMENDATION
The University of Michigan
School of Public Health
Department of Biostatistics

Hyun Min Kang, associate professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health, is recommended for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.

Academic Degrees:

Ph.D.	2009	University of California, San Diego
M.S.	2000	Seoul National University
B.S.	1998	Seoul National University

Professional Record:

2019-Present	Affiliate Faculty, Michigan Institute for Data Science, University of Michigan
2018	Visiting Professor, Department of Statistics, Seoul National University, Seoul, Korea
2017-Present	Associate Professor, Department of Biostatistics, University of Michigan School of Public Health
2016-2017	John G. Searle Assistant Professor of Biostatistics, University of Michigan School of Public Health
2011-2017	Assistant Professor, Department of Biostatistics, University of Michigan School of Public Health
2009-Present	Affiliate Faculty, Center for Statistical Genetics, University of Michigan School of Public Health
2009-Present	Affiliated Faculty, Center for Computational Medicine and Bioinformatics, University of Michigan Medical School
2009-2011	Research Assistant Professor, Department of Biostatistics, University of Michigan School of Public Health

Summary of Evaluation:

Teaching – Professor Kang has been key in the development of the health data science concentration in the Department of Biostatistics launched in fall 2019. Since his promotion to associate professor, Professor Kang has created a new modular course, Basic Computing for Data Analytics (Biostat 607) and revamped the course Advanced Topics in Computational Sciences (Biostat 815) to meet the need for advanced computational methods within the doctoral program. His winter 2019 evaluation ratings were excellent, with a Q1 median score of 4.5 and Q2 median score of 4.8. In addition to these courses, Professor Kang has taught other challenging courses, such as Introduction to Biocomputing (Biostat 606) which requires exemplary teaching skills and a deep and comprehensive understanding of the biostatistics literature, with both Q1 and Q2 scores of 4.5 in 2019. Professor Kang has been or is the chair/co-chair of six doctoral dissertation committees (three of whom have graduated) and has served or is serving as a member of 22 other dissertation committees.

Research – Professor Kang’s past work on using mixed models for genome-wide association studies (GWAS) and current work on single-cell analysis are two areas in which his work has had a world-wide scientific impact. His work aims to understand mechanisms of DNA variations and the microenvironments that influence molecular phenotypes, complex diseases, and disease-related traits focusing on statistical methods for GWAS and expression quantitative trait loci (eQTL) studies using the linear mixed model framework to account for hidden confounding factors. A second line of work focuses on single-cell RNA-sequencing (scRNA-seq) technologies that are enabling rapid and massively parallel profiling of single cell transcriptomes. Professor Kang plays a leading role in collaborative genetics and –omics projects of high significance, such as the Trans-Omics Precision Medicine (TOPMed) project, performing large-scale sequencing of blood- and heart-related phenotypes.

Professor Kang’s research record has been supported by his outstanding success in obtaining external funding. He currently has two National Institute of Health (NIH) R01 grants as the principal investigator (PI), one as a subcontract PI, and seven as a co-investigator. This is an outstanding record, demonstrating his own independent research strength, and the high regard in which he is held by collaborators. It is a particularly impressive record in today’s challenging research funding climate. Professor Kang has 112 peer-reviewed publications. He has 32 publications since his appointment to the rank of associate professor including one as first or co-first and seven as senior or co-senior author. His publications have appeared in leading journals including *Nature Genetics*, *Nature Biotechnology*, *American Journal of Human Genetics*, *Genome Research*, *Bioinformatics*, *Epigenetics*, and *Genetic Epidemiology*. Professor Kang has also made a broad impact by developing statistical methods, numerical algorithms, and 20 software tools.

Recent and Significant Publications:

- Kang, H.M., Subramaniam, M., Targ, S., Nguyen, M., Maliskova, L., Wan, E., Wong, S., Byrnes, L., Lanata, C., Gate, R., Mostafavi, S., Marson, A., Zaitlen, N.A., Criswell, L.A., Ye, C.J. (2018). Multiplexed droplet-based single cell RNA-sequencing using natural genetic barcodes, *Nature Biotechnology*, 36(1):89. PMID: 29227470; PMCID: PMC5784859.
- Zhang, F., Flickinger, M., Taliun, S.A.G., InPSYght Psychiatric Genetics Consortium, Abecasis, G.R., Scott, L.J., McCarroll, S.A., Pato, C.N., Boehnke, M., Kang, H.M. (2020) Ancestry-agnostic estimation of DNA sample contamination from sequence reads. *Genome Research*. 30(2):185-194, PMID: 31980570, PMCID: PMC7050530.
- Quick, C., Fuchsberger, C., Taliun, D., Abecasis, G., Boehnke, M., Kang, H.M. (2019) emeraLD: rapid linkage disequilibrium estimation with massive datasets. *Bioinformatics*. 35(1):164-166. PMID: 30204848; PMCID: PMC6298049.
- Zhou, W., Fritsche, L.G., Das, S., Zhang, H., Nielsen, J.B., Holmen, O.L., Chen, J., Lin, M., Elvestad, M.B., Hveem, K., Abecasis, G.R., Kang, H.M.*, Willer, C.J.* (2017) Improving power of association tests using multiple sets of imputed genotypes from distributed reference panels, *Genetic Epidemiology*, 41(8):744-755. PMID: 28861891; PMCID: PMC6324190.

Ryu, K.H., Huang, L., Kang, H.M., Schiefelbein, J. (2019) Single-cell RNA sequencing resolves molecular relationships among individual plant cells. *Plant Physiology*. 179(4):1444-1456 PMID: 30718350. PMCID: 6446759.

Service – Professor Kang has served on a number of departmental committees including the Admissions, Candidacy and Computing Committees, and the Biostatistics Faculty Search Committee during the 2018-2019 recruitment season. In the broader professional community Professor Kang is a member of the Sequence Read Archive (SRA) Data Working Group of the NIH Council of Councils and was recently appointed to serve on the National Library of Medicine Board of Scientific Counselors. He is a steering committee member for TOPMed Consortium, WGSPD (Whole Genome Sequencing in Psychiatric Disorders) Consortium, and the GECCO (Genetics and Epidemiology of Colorectal Cancer) Consortium. He also reviews for 22 journals and since his promotion to associate professor has served on the program committees for the Genome Sequencing Project TOP-Med Analysis Workshop and the Conference on Intelligent Systems for Molecular Biology (ISMB).

External Reviewers:

Reviewer A: “Dr. Kang has made multiple internationally recognized contributions to statistical, computational, and analytical methods for genomic data. I would assess Dr. Kang as being in the top 10% of researchers in his field at peer research universities. Dr. Kang’s international reputation, his scientific achievements, and his record of external funding definitely exceed the threshold for promotion to Professor of Biostatistics at my institution.”

Reviewer B: “In summary, Hyun Min Kang exceeds the bar by a large margin on every possible criterion for promotion to Professor. He is one of the most productive investigators working at the interface of computer science and its applications in modern problems of bioinformatics.”

Reviewer C: “Dr. Kang has had an astonishing impact in computational genomics in a very short period of time... It is hard to do justice to the impact that a gifted computational scientist like Dr. Kang can make in the scientific community. The high number of citations that Dr. Kang’s recently published (since 2017) papers have already received does not adequately convey the magnitude of his contribution to our community because scientists all over the world have been empowered to do new and better science by the software tools he has created...”

Reviewer D: “Dr. Kang is clearly on a path to become a leader in the field of computational and statistical genomics. He has a real talent for identifying cutting-edge topics in the field and developing innovative analytic approaches and software to address these topics.”

Reviewer E: “This is an easy letter to write, because Dr. Kang is doing some of the best work in the world in this field. Over and over again over the past decade he has brought sophisticated computational methods to the table to address important practical problems in genetic epidemiology. Moreover, he has implemented these solutions in usable software.”

Reviewer F: “Dr. Kang is a productive researcher, who works in large collaborative teams, but always makes his mark on the research, primarily by aiding in the sophisticated statistical analysis of huge computational challenges.”

Summary of Recommendation:

Professor Kang has made multiple internationally recognized contributions to statistical, computational, and analytical methods for genomic data. He has an outstanding record of teaching and mentorship for statistical genetics and computational genomics students at the University of Michigan, and he has enjoyed strong and consistent funding for his research program from the NIH. He is one of the most productive junior investigators working at the interface of computer science and its applications in modern problems of genetics and bioinformatics, and has been an outstanding citizen of our biostatistics community and an active member of the broader biostatistics profession. It is with the support of the School of Public Health Executive Committee that we recommend Hyun Min Kang for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.



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

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