Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Jonathan Terhorst, assistant professor of statistics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of statistics, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2017	University of California, Berkeley
M.A.	2011	San Francisco State University
B.A.	2004	University of California, Berkeley

Professional Record:

2017-present	Assistant Professor, Department of Statistics, University of Michigan, Ann Arbor

Summary of Evaluation:

Teaching: Professor Terhorst has taught two undergraduate courses at Michigan (Stats/DataSci 306 and topics), and three graduate courses (Stats 507, Stats 604, and topics). His main undergraduate teaching has been Stats 306, a core required course in statistical computing which he developed essentially from scratch and scaled up to current enrollments of about 150. He also developed Stats 604, a Ph.D.-level statistical practice course, and helped to keep Stats 507 updated. Developing and teaching modern computing courses is crucial for keeping our programs current, and his curricular contributions to the department are invaluable. He sets a high standard for his students for both workload and grading, which has resulted in some dissatisfaction expressed in evaluations, but they have improved over time. Professor Terhorst has advised four doctoral students so far and served on committees of eight others; he has also co-supervised a post-doctoral fellow and an undergraduate honors thesis. He has published multiple papers with his trainees in top venues, and his mentoring record overall is outstanding.

Research: Professor Terhorst's research combines statistical methods, biological knowledge, algorithmic and computational innovation, and sophisticated probabilistic analysis to solve problems in population genetics and phylodynamics. A key to his work is combining evolutionary and genetic models with probabilistic models and developing innovative inference techniques leading to scalable computational algorithms suitable for large modern genomic datasets. The in-depth mathematical analysis he is known for provides fundamental understanding of what can and cannot be inferred from genetic sequences. His algorithms have found use in top genetics labs across the world, and his excellent funding record from NIH and NSF reflects the importance and the recognition of his work in the very competitive world of genetics research.

Recent and Significant Publications:

Mathieson, I. and Terhorst, J. (2022). Direct detection of natural selection in Bronze Age Britain. *Genome Research*, *32*(11-12), 2057–2067.

Legried, B. and Terhorst, J. (2022). A class of identifiable phylogenetic birth–death models. *Proceedings of the National Academy of Sciences*, *119*(35), e2119513119.

Ki C. and Terhorst, J. (2022). Variational phylodynamic inference using pandemic-scale data. *Molecular Biology and Evolution*, *39*(8), msac154.

Ki, C. and Terhorst, J. (In press). Exact decoding of a sequentially Markov coalescent model in genetics. *Journal of the American Statistical Association*, in press.

Dilber, E. and Terhorst, J. (2022). Robust detection of natural selection using a probabilistic model of tree imbalance. *Genetics*, *220*(3), iyac009.

Service: Professor Terhorst has served on nearly every committee in his department and has chaired one for the last two years. He has participated in many department- and university-level efforts to mentor and support underrepresented students, has served on the department's DEI committee and has contributed far above average levels to various campus-wide outreach and mentoring efforts aimed at underrepresented students. His record of professional service (refereeing, conference organizing, grant review panels) is excellent and fully meets expectations.

External Reviewers:

Reviewer (A): "Dr. Terhorst is already a star researcher in our field, and I can only admire his track record of research, teaching, and service. He has few peers. He absolutely deserves promotion and would have been promoted years ago if he was at my institution."

Reviewer (B): "His work showed a marked improvement in terms of accuracy and efficiency over earlier approaches…Although it built on earlier work by others, it set a standard for quality that may not yet have been beaten…I don't think there are many in the field of theoretical population genetics who could compete [with Professor Terhorst] in terms of mathematical sophistication, even among the more established faculty."

Reviewer (C): "Dr. Terhorst is an amazingly well rounded statistician who makes important contributions to statistical theory, methodology, and applications. I say 'amazingly' because most of us are good at one or two out of these three broad subdomains of statistics, and it is rare for statisticians to be able to make meaningful intellectual contributions to all three consistently."

Reviewer (D): "Dr. Terhorst is one of the top 3 in his peer group and importantly to me, his contributions are more fundamental than the contributions of his peers. Because his contributions are more mathematical and informative to the community of methods developers, I suspect he may have less name recognition in the broader biological community than some of his peers, but that does not belie the major importance of his work."

Reviewer (E): "Prof. Jonathan Terhorst is an innovative and scholarly researcher with a leading profile at the intersection of statistics, population genetics, and phylogenetics. He has an excellent body of work from his time as a faculty member, often with real elegance and unexpected integration of ideas; impressively, the most significant work has been conducted in papers he has led with his PhD students. The file certainly merits promotion to Associate Professor with tenure, and I look forward to seeing what surprising connections he makes next."

Reviewer (F): "In summary, I strongly support [Professor Terhorst's] promotion to a tenured associate professor position in your department. He is a deep, careful thinker, and the methods that he develops are rigorous, statistically sound, and highly creative. I think the fields of evolutionary biology and statistical genetics need more researchers like him."

Summary of Recommendation:
Professor Terhorst is a highly original and productive researcher whose work combines his deep knowledge of statistics, genetics, and computing, and whose contributions to phylogenetics in particular have been very impactful. He has made outstanding curriculum contributions to statistics programs, developing new courses in computing and practice which are in high demand. He is a thoughtful and committed teacher with high standards, as well as an excellent Ph.D. advisor and mentor. He contributes diligently to the department and the profession through service, and his efforts on outreach and mentoring for underrepresented students are noteworthy. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Assistant Professor Jonathan Terhorst be promoted to the rank of associate professor of statistics, with tenure, College of Literature, Science, and the Arts.

Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

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