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

Susan Murray, 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:

Sc.D. (Biostatistics)	1994	Harvard University
M.S. (Biostatistics)	1992	Harvard University
B.A. (Mathematical Sciences)	1990	Rice University
B.A. (Statistics)	1990	Rice University
B.A. (English)	1990	Rice University

Professional Record:

2002-present	Associate Professor, Department of Biostatistics, University of Michigan
2001-2010	Senior Biostatistician, Scientific Registry of Transplant Recipients
1996-2002	Assistant Professor, Department of Biostatistics, University of Michigan
1995-1996	Instructor of Biostatistics, Harvard Medical School
1994-1996	Post-doctoral Research Fellow, Department of Biostatistics, Harvard University

Summary of Evaluation:

Teaching: Since her promotion to associate professor, Professor Murray has taught biostatistics 602 (a required course on the fundamentals of statistical inference) three times, biostatistics 619 (a master's level course on the analysis of clinical trials) three times, biostatistics 875 twice (an optional doctoral level course on advanced methods for survival analysis), biostatistics 503 twice (a required course that provides an introduction to biostatistics to MPH students), biostatistics 675 twice (an optional master's level course on survival analysis), biostatistics 560 (a required course that introduces statistical methods to epidemiology students) once, and biostatistics 558 (a service course that is no longer offered) once.

Across all master's and doctoral level courses taught to biostatistics students, Professor Murray has averaged scores of 4.35 (Q1) and 4.51 (Q2) – which are excellent. Scores on service courses taught to more diverse audiences that mainly include students from other departments have been lower, averaging 3.42 (Q1) and 3.39 (Q2). This discrepancy is not unusual and mainly reflects the difficulty of teaching to diverse audiences rather than shortcomings of the instructor. The record easily demonstrates Professor Murray's ability to teach a variety of our courses well. She is highly valued and her courses are highly sought among our students, as is clear from consistently high enrollment in the elective courses she has taught.

She has also been active in advising students; seven of her students have graduated and two are currently in faculty positions. She has served on many additional doctoral committees as a member.

Research: Professor Murray has an excellent research record. She has 74 published peer reviewed articles, with 15 where she is first or senior author and an additional six where one of her doctoral students is first author (we count these as substantial contributions also, since we strongly encourage our faculty to provide doctoral students with opportunities for lead authorship on manuscripts).

There has been a clear shift in emphasis for Professor Murray's research since her promotion to associate professor. Before her promotion, the vast majority of her manuscripts were methodological in nature (9/15). Since her promotion, a much smaller proportion of her manuscripts have been methodological (9/59). This more modest level of methodological contributions, in our view, reflects a deeper involvement by Professor Murray in the scientific questions related to lung and heart disease in general and to lung transplantation in particular.

Professor Murray's work has been impactful. She has an h-index of 37, corresponding to 37 papers with 37 or more citations (and about 15 with >100 citations). Several of these have had an impact on clinical care, a feat few of us achieve. For example, in a 2006 paper, Professor Murray and colleagues outlined a new allocation system for lung transplants. This work shifted the paradigm for a system where organs were allocated based on time in waiting list, to one where benefit to transplant recipient was also modeled.

Although her major emphasis has shifted to collaborative research over time (and she has made important contributions there, as illustrated by her Lung Allocation Score, embodied in the current system for allocating lung transplants in the United States), she has continued to be active in methodological research, refining methods for survival analysis to allow for quality of life adjusted survival times, paired outcomes (as occur in ophthalmic disorders, for example), and informative censoring of observations.

Service: Professor Murray's service is diverse, substantial and important. She has been a regular contributor to key departmental committees, and chaired these several times. She has also served the school in a variety of roles, including on ad-hoc committees that have dealt with sensitive matters. She has served as editor for top journals and contributed to the organization of key meetings in our profession by serving on their program committees. Professor Murray is active in both manuscript and grant review. She has taught a diverse set of courses, serving biostatistics masters and doctoral students as well as other students in the school. Her evaluations are typically excellent. She is active in mentoring of doctoral students.

Recent and Significant Publications:

Nabihah Tayob, Susan Murray. Nonparametric Tests of Treatment Effect for a Recurrent Event Process that Terminates. *Biostatistics*. 2015. 16 (1): 73-83

Fang Xiang, Susan Murray and Lyrica Xiaohong Liu. Analysis of Transplant Urgency and Benefit via Multiple Imputation. (Murray is senior author; other authors are former graduate students.) 2014. *Statistics in Medicine*. 33 (26): 4655-4670

Fang Xiang, Susan Murray. Restricted Mean Models for Transplant Benefit and Urgency. 2012. *Statistics in Medicine*. 31, pp. 561-576. http://hdl.handle.net/2027.42/91893

Lyrica Xiaohong Liu, Susan Murray, Alex Tsodikov. Multiple Imputation Based on Restricted Mean Models for Censored Survival Data. 2011. *Statistics in Medicine*. 30, pp. 1339-1350. http://hdl.handle.net/2027.42/91894

Adin-Cristian Andrei and Susan Murray. Estimating the Quality-of-Life-Adjusted Gap Time
Distribution of Successive Events Subject to Censoring. 2006. *Biometrika*, 93 (2), pp. 343-355.
http://hdl.handle.net/2027.42/91896

External Reviewers:
Reviewer (A): "Dr. Murray's record shows excellence in each of the areas I have named. She has made enormous contributions in the area of pulmonary and thoracic research…she has maintained a very high level of grant funding…the methodology for her research is substantial and innovative…"

Reviewer (B): "Most noteworthy…is her very significant leadership role in the development of new policy for the way lungs are allocated to patients awaiting transplantation…"

Reviewer (C): "Dr. Murray appears to me to be the quintessential applied biostatistician…"

Reviewer (D): "…promotion may be overdue in her case."

Reviewer (E): "It is unusual to find a biostatistician who provides leadership for an important medical issue and also carries that application into her methodology research program. I recommend that she be promoted to Professor…"

Reviewer (F): "In Biostatistics, promotion to professor should generally be evaluated both on contributions to methodology and on leadership in collaborations. Dr. Murray appears to have an excellent record in both areas."

Reviewer (G): "I strongly support the promotion of Dr. Murray to professor, with tenure."

Reviewer (H): "Dr. Murray has an excellent funding record as a co-investigator although she has apparently not served as PI of an NIH or NSF grant. Murray's overall record…is well deserving of this promotion and I have no hesitation in supporting it."

Summary of Recommendation
Professor Murray is an excellent and valued colleague who has made an impact on public health and on our school. She has made useful contributions to statistical analysis methodology and has developed deep expertise and scientific leadership in the area of lung and heart disorders. Her work in developing the current national score for allocation of lung transplants is especially impactful and, by encouraging organ allocation to consider benefit to the recipient in addition to time in queue, will have helped many enjoy improved quality of life. She is an excellent teacher and is active in service to her profession. It is with the support of the School of Public Health Executive Committee that I recommend Susan Murray for promotion to professor of biostatistics, with tenure, Department of Biostatistics, School of Public Health.

Martin A. Philbert
Dean, School of Public Health

May 2015