Biostatistics

As one of the nation’s premier centers of biostatistical research, the Department of Biostatistics is dedicated to addressing high priority public health and biomedical issues and driving scientific discovery through specialized analytic techniques and catalyzing interdisciplinary research.

Our world-renowned experts are engaged in developing novel statistical methods to break new ground in current research frontiers. The Department has become a leader in the analysis and interpretation of complex data in genetics, brain science, clinical trials, and personalized medicine. In these and other areas, our faculty play key roles in public health, mental health, social science, and biomedical research as collaborators and conveners. Current research is wide-ranging.

Examples of our work:

- Researching efficient statistical methods using large-scale biomarker data for disease risk prediction, informing clinical trial designs, discovery of personalized treatment regimes, and guiding new and more effective interventions
- Analyzing data to link cancer risk to specific environmental, behavioral, or biological exposures over the lifecourse
- Developing statistical methods for summarizing toxicity burden and toxicity trajectories to incorporate the information in the design of early phase clinical trials
- Developing and applying statistical methods to analyze complex survey data and data with missing values, providing important support to biomedical research across a number of disciplines, including epidemiology, environmental health sciences, and health policy and management

MISSION

Our mission is to improve disease prevention, diagnosis, treatment, and the public’s health by developing new theoretical results and applied statistical methods, collaborating with scientists in designing informative experiments and analyzing their data to weigh evidence and obtain valid findings, and educating the next generation of biostatisticians through an innovative and relevant curriculum, hands-on experience, and exposure to the latest in research findings and methods.

HISTORY

Founded in 1940 as the Division of Biostatistics, one of the first of its kind in the nation, the Mailman School’s Department of Biostatistics was established to meet the growing need for biostatistical expertise in the fields of public health, medicine, and the population sciences. Today, we continue our mission by collaborating with partners at Columbia University Medical Center as well as outside agencies and institutions around the world.
The Department of Biostatistics offers an intellectually stimulating and collegial environment. Our faculty work at the frontier of public health and medicine, leading research teams that investigate some of today’s most pressing health issues. Recruited from the top universities from around the world, the faculty bring to the School a wealth of experience that serves to inform their research and teaching. The Department lays claim to three winners of the Columbia University Presidential Award for Teaching Excellence, several winners of the Mailman School Teaching Excellence Award, and consistent top rankings in course evaluations. Under the leadership of Dr. DuBois Bowman, the department continues its long tradition of cultivating the next generation of biostatisticians who will drive new discoveries and offer pathbreaking capabilities to formulate evidence-based decisions.

Select projects and research

- Novel statistical methods are being investigated for rigorous analysis of high-throughput genetics data. These methods have led to the discovery of new genes, which influence risk to schizophrenia and autism, and are being used to uncover additional genes.

- Faculty develop statistical methods for growth trajectories, inference for optimal treatment rules in personalized medicine, tests of hazard rate ordering using empirical likelihood, and marginal screening of predictors in high-dimensional regression problems.

- Research into stroke’s impact on motor control have uncovered valuable trends across patients in person-level control deficits related to stroke severity.

- Studies have quantified the effects of aging on daily physical activity intensity patterns, furthering understanding that older age is primarily associated with decreasing activity in the late afternoon but not in the morning.

- Investigations are focused on discovering biomarkers for Parkinson’s disease from a combination of massive brain imaging datasets reflecting various properties of brain function and structure, clinical data, and biologic data.

- The development of two complex methods – quantile regression methods to investigate genetic association with secondary quantitative human traits in genome-wide association studies and statistical methods for sequencing studies – have been applied to chronic obstructive pulmonary disease, stroke, and breast cancer research.

- The department is researching sequential methods for selecting subsets of promising new therapies in phase II clinical trials controlling the probability of false declarations while maintaining high probability of acceptable subset selections.