

# Department of Epidemiology and Biostatistics

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Epidemiology is the science that studies disease occurrence and health states in human populations; and is the basic science of public health, evidence-based medicine, and comparative effectiveness research. Epidemiologists study the frequency, distribution, and causes of disease, disability, and health states in human populations and use this information to develop prevention and control strategies for the improvement of population health. The faculty affiliated with the Department of Epidemiology and Biostatistics have expertise in genetic/molecular, environmental, social, psychosocial, and behavioral-related factors in human health and disease. They also have expertise in basic and cutting-edge biostatistical methods and team with other experts and clinicians to study various infectious diseases and the major chronic diseases of the era (obesity, type 2 diabetes, cardiovascular disease, cancers, Alzheimer's disease and related dementia). Our active research programs provide our students with many outstanding opportunities to participate actively in cutting-edge research. See the Department website for specifics on the latest projects.

The Department provides rigorous training in the fundamentals and practice of epidemiology and biostatistics and offers programs of study leading to the M.S. or Ph.D. in Epidemiology. Departmental faculty contribute to the core courses and provide guidance on curricular and programmatic activities for the M.P.H.'s Concentration in Epidemiology and the M.P.H.'s Concentration in Biostatistics. The Department offers undergraduate courses primarily in support of the B.S. in Public Health Sciences. In addition, upper-division undergraduates irrespective of their major who would like additional experience in epidemiology and biostatistics may arrange to take directed-studies courses with Departmental faculty (EPIDEM#199). Diversity and inclusion are core values of the Department and reflect our mission to improve population health through research, education, community engagement and translation of discoveries to practice.

- Epidemiology, M.S.
- Epidemiology, Ph.D.

## Courses

### EPIDEM 199. Undergraduate Research in Epidemiology. 2-4 Units.

Provides disciplinary research participation. Original or existing research options provide undergraduates the opportunity for faculty/mentor interactions including access to appropriate facilities. Medical Epidemiology research areas: Cancer, Genetic/Molecular, Environmental, Occupational, Biostatistics, and Infectious Disease.

Repeatability: Unlimited as topics vary.

Restriction: Upper-division students only.

### EPIDEM 200A. Principles of Epidemiology. 4 Units.

Fundamental principles of epidemiology, biostatistics, and epidemiological research. Topics include research methods of measuring health problems in populations, disease control and prevention in populations, how epidemiology contributes to knowledge of disease etiology, and biostatistical analysis and interpretation of epidemiologic data.

Same as PUBHLTH 206A.

Restriction: Graduate students only.

### EPIDEM 200B. Intermediate Epidemiology. 4 Units.

Explores conceptual aspects of epidemiology, focusing on strengths and limitations of observational designs. Learn to identify, quantify, and correct bias (e.g. selection, confounding), and evaluate causal identical conditions. Gain skills to evaluate study designs systematically.

Prerequisite: PUBHLTH 206A. PUBHLTH 206A with a grade of B or better

Same as PUBHLTH 206B.

Restriction: Graduate students only. Epidemiology Majors only. College of Health Sciences students only. Master of Public Health Degree students only. Program in Public Health students only.

**EPIDEM 200C. Advanced Epidemiologic Methods. 4 Units.**

Advanced topics in the design and statistical analysis of epidemiologic studies. Topics include simulation methods, counter-matching and multiphase study designs, missing data, and Bayesian analysis. Published simulation studies are discussed and replicated using the R software package.

Prerequisite: EPIDEM 200A and EPIDEM 200B. EPIDEM 200A with a grade of B or better. EPIDEM 200B with a grade of B or better

Same as PUBHLTH 206C.

**EPIDEM 200D. Advanced Epidemiologic Methods and Causal Inference I. 4 Units.**

Research design, questions, and analysis tasks, emphasizing theory, methods, and approaches for estimating causal effects in health/social sciences from observational data. Toolset for asking and answering research questions and interpreting evidence. Part one of a two-quarter advanced causal inference course.

Prerequisite: EPIDEM 200C. EPIDEM 200C with a grade of B or better

Restriction: Graduate students only.

**EPIDEM 200E. Advanced Epidemiologic Methods and Causal Inference II. 4 Units.**

Explore causal inference methods in epidemiology and public health. From general theory covered in the first quarter, delve into specific methods for estimating causal effects from observational data. Gain an in-depth understanding of these techniques and their applications.

Prerequisite: EPIDEM 200D. EPIDEM 200D with a grade of B or better

Restriction: Graduate students only.

**EPIDEM 201. Cancer Epidemiology. 4 Units.**

Concentrates on understanding how epidemiology plays a role in the search for cancer etiology, prevention, control, and treatment; gives an overview of cancer research with an appreciation of the multidisciplinary nature of the field.

Prerequisite: EPIDEM 200A or PUBHLTH 206A. EPIDEM 200A with a grade of B- or better. PUBHLTH 206A with a grade of B- or better

Same as PUBHLTH 216.

Restriction: Graduate students only.

**EPIDEM 202. Genetic Epidemiology. 4 Units.**

Genetic epidemiologic research principles, covering diverse study designs and methods. Integrates literature examples, lectures, demonstrations, and software applications for varied study designs, ranging from unrelated individuals to large extended kindreds. Includes in-class discussions, group projects, and exercises for concept reinforcement.

Prerequisite: PUBHLTH 203 or EPIDEM 203 or PUBH 206. PUBHLTH 203 with a grade of B- or better. EPIDEM 203 with a grade of B- or better. PUBH 206 with a grade of B- or better

Restriction: Graduate students only.

**EPIDEM 204A. Biostatistics I: Introduction to Statistical Methods. 4 Units.**

Introduction to the basic statistical techniques commonly used in public health research. Topics include descriptive statistics, basic probability, inferential statistics (estimation, confidence intervals, and hypothesis testing), and contingency tables. SAS software is introduced.

Same as PUBHLTH 204A.

Restriction: Graduate students only.

**EPIDEM 204B. Biostatistics II: Intermediate Statistical Methods. 4 Units.**

Explores advanced statistical analysis methods for biological and medical applications. Topics include linear, logistic, and generalized linear regression models like Poisson regression.

Prerequisite: EPIDEM 204A. EPIDEM 204A with a grade of B or better

Same as PUBHLTH 204B.

Restriction: Graduate students only.

**EPIDEM 204C. Biostatistics III: Advanced Statistical Methods. 4 Units.**

Intended for graduate students in epidemiology, public health, and related fields. Introduces statistical methods for analyzing survival and longitudinal/clustered data, and techniques to resolve missing data.

Prerequisite: EPIDEM 204B. EPIDEM 204B with a grade of B or better

Same as PUBHLTH 204C.

Restriction: Graduate students only.

**EPIDEM 204D. Biostatistics IV: Survival Analysis. 4 Units.**

Advanced statistical analysis for epidemiologic studies, focusing on time-to-event data. Modern approaches, covering survival analysis, missing data, and statistical power analysis. SAS procedures PHREG, LIFEREG, and LIFETEST for intricate dataset analysis. Emphasis on model selection and proper interpretation.

Prerequisite: EPIDEM 204C. EPIDEM 204C with a grade of B or better

Restriction: Graduate students only.

**EPIDEM 205. Environmental Epidemiology. 4 Units.**

Concentrates on epidemiological approaches to the assessment of community environmental hazards; issues involved in environmental exposure estimation; interdisciplinary approaches to environmental epidemiology, including the use of biomarkers of exposures and susceptibility; epidemiological studies within the context of risk assessment.

Prerequisite: EPIDEM 200 and EPIDEM 204. EPIDEM 200 with a grade of B- or better. EPIDEM 204 with a grade of B- or better

Restriction: Graduate students only.

**EPIDEM 212. Methods for Design and Implementation of Epidemiologic Research. 2 Units.**

Intended for students in epidemiology, public health, and related fields, and covers topics in subject recruitment, data collection, quality assessment and control, and sample-size estimation.

Corequisite: PUBHLTH 206B

Prerequisite: EPIDEM 200A and EPIDEM 204A. EPIDEM 200A with a grade of B or better. EPIDEM 204A with a grade of B or better

Repeatability: May be taken for credit 2 times.

Restriction: Graduate students only.

**EPIDEM 215. Introduction to Statistical Genetics. 4 Units.**

Provides students with knowledge of the basic principles, concepts, and methods used in statistical genetic research. Topics include principles of population genetics, and statistical methods for family- and population-based studies.

Prerequisite: Two quarters of upper-division or graduate training in statistical methods.

**EPIDEM 220A. Data Management I. 2 Units.**

Learn SAS basics, Base SAS, DATA step essentials, and PROCs for data exploration and analysis. Topics include data reading, variable creation, sorting, merging, and common functions. Priority for MS/PhD Epidemiology, MPH Epidemiology/Biostatistics students concurrently enrolled.

Restriction: Graduate students only. Program in Public Health students only.

**EPIDEM 220B. Data Management II. 2 Units.**

Develop SAS proficiency in epidemiology/public health research. Goals include expanding SAS knowledge, enhancing self-sufficiency via online resources, and understanding program outcomes. Reinforce study design and data analysis basics while emphasizing SAS as a tool for data management.

Prerequisite: EPIDEM 220A and EPIDEM 200A and EPIDEM 204A. EPIDEM 220A with a grade of B or better. EPIDEM 200A with a grade of B or better. EPIDEM 204A with a grade of B or better

Restriction: Graduate students only. Program in Public Health students only.

**EPIDEM 232. Cardiovascular Disease Epidemiology and Prevention. 4 Units.**

Epidemiological aspects of chronic human diseases. Topics include methodologies for quantifying aspects of prevalent chronic diseases including risk factors, identification of susceptible groups, societal burdens, promising future research; and the intervention, prevention, and control of diseases in populations.

Restriction: Graduate students only.

**EPIDEM 244. Toxic Chemicals in Environment. 4 Units.**

Industrial ecology of toxicants and their impacts on environmental quality and human health. Explores theoretical basis of toxicity thresholds and regulatory issues. Uses classic and contemporary research articles to understand the legacy of traditional toxicants, and to identify emerging threats.

Restriction: Graduate students only.

**EPIDEM 264. Introduction to Environmental Health Science. 4 Units.**

Explores environmental health's role in disease prevention. Studies human-environment interaction, focusing on chemical, physical, and biological agents in community and occupational settings. Covers climate change, environmental justice, children's health, exposure assessment, and policy for public health improvement.

Same as EHS 264, PUBHLTH 264.

Restriction: Graduate students only. Environ Health Sci and Policy Majors only. Environmental Health Sciences Majors only. Epidemiology Majors only. Public Health Majors only.

**EPIDEM 269. Air Pollution, Climate, and Health. 4 Units.**

Emission of air pollutants into the atmosphere, physical and meteorological processes that affect transport, and influence on global warming. Concepts of how and where people are most exposed, and how exposures and health effects differ in developed and developing regions.

Same as EHS 269, PUBHLTH 269.

**EPIDEM 275. Special Topics in Epidemiology. 1-4 Units.**

Presents various topics and the latest research in the broad field of epidemiology.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

**EPIDEM 280. Epidemiology Research Journal Club. 1 Unit.**

Research journal club is a group discussion of recent publications in epidemiology and related fields. Students rotate as lead discussants, guided by faculty. All attendees are expected to be familiar with the papers at the start of class.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 282. Epidemiology Department Seminar. 1 Unit.**

A forum for the presentation of recent research to epidemiology students, faculty, and other interested parties. The atmosphere is informal, yet rigorous. Speakers range from graduate students through distinguished visitors from other institutions.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 290. Introduction to Biostatistics and Epidemiology for Medical Fellows. 4 Units.**

Prepares medical fellows and other physicians for rotations in research programs. Understanding of basic biostatistics and study design, and interdependencies between the two. Application of principles in evaluation of medical literature for guidance on patient care and public health policy.

Prerequisite: Medical degree.

**EPIDEM 296. M.S. Thesis Research and Writing. 1-12 Units.**

Individual research and study necessary for a graduate student to prepare and complete the thesis required for the Master of Science (M.S.) degree.

Prerequisite: Advancement to candidacy.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 297. PhD Degree Dissertation Research & Writing. 1-12 Units.**

Individual research and study necessary for a graduate student to prepare and complete the dissertation required for the Doctor of Philosophy (Ph.D.) degree.

Prerequisite: Advancement to candidacy.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 298. Directed Study in Epidemiology. 2-4 Units.**

Directed study with Epidemiology faculty.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 299. Independent Study in Epidemiology. 2-8 Units.**

Independent research with Epidemiology faculty.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.

**EPIDEM 399. University Supervised Teaching. 2-4 Units.**

Limited to students with active Teaching Assistant (T.A.) appointments.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.