

# Epidemiology

## Head

- Elizabeth A. Chrischilles

**Graduate degrees:** MS in clinical investigation; MS in epidemiology; PhD in epidemiology

**Faculty:** <https://www.public-health.uiowa.edu/epi-faculty-list/>

**Website:** <https://www.public-health.uiowa.edu/epi/>

The Department of Epidemiology strives to improve public and personal health by conducting innovative research addressing the magnitude, determinants, prevention, and management of disease and its consequences; educating researchers and public health practitioners; and collaborating with clinicians, communities, and public health agencies in the measurement and evaluation of health status and prevention effectiveness.

Students are guided by faculty members whose research interests include pharmacoepidemiology, cancer epidemiology, infectious disease epidemiology, antimicrobial resistance, immunology, adverse reproductive outcome epidemiology, genetics, cardiovascular disease, nutrition, maternal and child health, clinical epidemiology, socioenvironmental determinants, occupational and environmental epidemiology, psychiatric epidemiology, social epidemiology, neuroepidemiology, injury and violence prevention, road traffic safety, substance use disorders, mental health, intervention trials, diabetes, global health, and effects of aging.

In addition to the MS in epidemiology, the MS in clinical investigation, and the PhD in epidemiology, the department offers the epidemiology subprogram for the Master of Public Health degree; see Master of Public Health, MPH in the catalog. The subprogram focuses on fundamental concepts and methods, and provides training in the use of data and methods for disease assessment and for evaluation of programs and interventions.

The MS in epidemiology and the MPH with an epidemiology subprogram are offered as part of the Undergraduate to Graduate (U2G) program which provides an opportunity for University of Iowa students interested in health science to earn both their undergraduate and graduate degrees in five years. For more information about the U2G program that combines an undergraduate degree with the MS in epidemiology or the MPH (epidemiology subprogram), visit MS in Epidemiology—Undergraduate to Graduate on the Department of Epidemiology website or MPH in Epidemiology—Undergraduate to Graduate on the College of Public Health website.

## Certificates

### Emerging Infectious Disease Epidemiology

The Department of Epidemiology offers the graduate Certificate in Emerging Infectious Disease Epidemiology. The certificate program provides basic information and training related to infectious diseases. It is designed for a broad range of individuals, including graduate students, international public health professionals, laboratory professionals, physicians, nurses, veterinarians, and medical technologists. To learn more, see the Certificate in Emerging Infectious Disease Epidemiology in the catalog.

## Translational and Clinical Investigation

The Department of Epidemiology and the Institute for Clinical and Translational Science offer the graduate certificate program in translational and clinical investigation; see the Certificate in Translational and Clinical Investigation in the catalog.

## Programs

### Graduate Programs of Study

- Epidemiology subprogram for the Master of Public Health degree
- Master of Science in Clinical Investigation
- Master of Science in Epidemiology
- Doctor of Philosophy in Epidemiology

## Facilities and Resources

### Clinical and Health Services and Chronic Disease Epidemiology

The Iowa Cancer Registry (ICR), a component of the State Health Registries of Iowa in cooperation with the Iowa Department of Public Health, collects medical data on every Iowan diagnosed with cancer and compiles survival and mortality data. The Iowa Cancer Registry is one of 18 registries nationwide reporting data to the National Cancer Institute.

The Iowa Registry for Congenital and Inherited Disorders is a component of the State Health Registries of Iowa that monitors the occurrence etiology of birth defects for the State of Iowa.

The Holden Comprehensive Cancer Center, including faculty leadership in the Cancer Epidemiology Program and the Population Science Core.

The Health Effectiveness Research Center (HERCe) is a collaborative research enterprise between the Department of Epidemiology and the College of Pharmacy which studies whether particular health care treatments or services are over- or under-utilized in practice. HERCe researchers study variation in practice patterns and associate outcome differences with this variation.

The Preventive Intervention Center conducts population-based intervention trials to prevent the occurrence and recurrence of disease and to promote wellness and health. Trials have focused on major health problems, particularly in elderly men and women, including the Fracture Intervention Trial, the Hormone Estrogen Replacement Study, and the Women's Health Initiative.

The Nutrition Center provides expertise in nutrition and dietary assessment, dietary interventions, and nutrition lifestyle change strategies with a focus on the research, teaching, and service missions of the Department of Epidemiology and the College of Public Health.

The Institute for Clinical and Translational Science partners with all University of Iowa colleges and emphasizes working in community partnerships between the academic medical center, local health care providers, and the rural patient population.

## Infectious Disease Epidemiology

The UI Center for Emerging Infectious Diseases (CEID) research projects study infectious diseases, often zoonotic, whose incidence in humans has increased over the past two decades or threatens to increase in the near future.

## Injury Epidemiology

- University of Iowa Injury Prevention Research Center
- Heartland Center for Occupational Health and Safety

## Courses

### Epidemiology Courses

#### **EPID:4314 Field Experiences in Public Health 1 s.h.**

Direct involvement in actions being taken at local community level; topics include environmental health, infectious diseases, chronic diseases, and pediatric health; practical examples and hands-on experiences during site visits for topic-specific field investigations. Offered spring semesters. Prerequisites: BIOL:1140 or BIOL:1141 or BIOL:1411. Requirements: biology or microbiology coursework. Same as CPH:4250.

#### **EPID:4350 Maternal and Child Health Seminar 1 s.h.**

Historical and applied perspective on maternal and child health problems and programs aimed at reducing morbidity, mortality, and health disparities across the life span. Same as CBH:4350.

#### **EPID:4400 Epidemiology I: Principles 3 s.h.**

Epidemiological concepts and methods; design of descriptive and analytic studies, such as aggregate, case series, cross-sectional, case-control, cohort studies, clinical trials; application of epidemiology to public health practice; communication and dissemination of epidemiological findings. Recommendations: junior or higher standing.

#### **EPID:4510 Injury and Violence Prevention 3 s.h.**

Theory, research, and practice of injury control; unintentional and intentional injuries; local, national, international injury issues. Same as CPH:4230, OEH:4510.

#### **EPID:4650 Maternal Health in Migrant Communities 2 s.h.**

Applied epidemiological and community-engaged research methods to understand clinical and social determinants of maternal and child health and reproductive care. Travel to La Casona territory in Costa Rica to learn about health systems in the context of the Costa Rica Social Security Fund. Same as CPH:4650.

#### **EPID:5214 Meta-Analysis of Epidemiologic Studies 3 s.h.**

Methods for quantitative pooling of analytic study associations (cohort and case-control) between exposure and a dichotomous outcome; literature searches, data abstraction, test of homogeneity, publication bias and consideration of adjusted risk ratios (effects of confounding). Offered spring semesters of odd years. Prerequisites: BIOS:5120 and EPID:4400.

#### **EPID:5241 Statistical Methods in Epidemiology 4 s.h.**

Overview of methods to analyze data from epidemiologic investigations; estimation of relative measures of risk, attributable risk, stratified analysis; model-fitting approaches using linear, logistic, and Poisson regression analysis; confounding and effect modification; analysis of epidemiologic data sets. Offered spring semesters.

#### **EPID:5250 Physical Activity Epidemiology 3 s.h.**

Overview of epidemiological evidence on how physical activity, sedentary behavior, and sleep affect health outcomes including cardiovascular disease, diabetes, cancer, and obesity; emphasis on research design, interpretation of studies, selection of appropriate measurement tools, and translating scientific findings to recommendations/policies for health promotion and disease prevention. Same as HHP:5200.

#### **EPID:5300 Food Safety 3 s.h.**

Current issues and concepts of food safety in the United States, from plant to table; foodborne illness from microbial agents, food toxins, adulterants; disease investigation, risk analysis, risk mitigation, prevention. Offered summer sessions.

#### **EPID:5350 Foundations of Maternal and Child Health 3 s.h.**

Life course approach to understanding determinants, mechanisms, and systems that promote and maintain health, safety, and well-being of mothers and their children. Prerequisites: EPID:4350. Same as CBH:5350.

#### **EPID:5450 Foundations of Maternal and Child Health II 3 s.h.**

Applied approach to developing, implementing, and evaluating programs to benefit pregnant and birthing individuals and their children; working with community and/or government organizations to meet the needs of children, adolescents, and parents/guardians. Prerequisites: EPID:4350 and EPID:5350. Same as CBH:5450.

#### **EPID:5470 Applied Veterinary Epidemiology/ Biostatistics 3 s.h.**

Epidemiology and biostatistics applied to veterinary public health; outbreak investigations, surveillance, analyzing and evaluating diagnostic tests, translation methodology, risk assessment, data analysis software programs. Offered summer sessions. Prerequisites: EPID:4400.

#### **EPID:5500 Introduction to Clinical Epidemiology 3 s.h.**

Epidemiologic applications and methods used in clinical settings to evaluate clinical medicine and other health profession disciplines including health measurement, health outcome determination, diagnostic process, risk assessment and communication, prognosis, study design, patient surveys, clinical trials, decision analysis and meta-analysis, health services research. Offered fall semesters. Corequisites: EPID:4400, if not taken as a prerequisite.

#### **EPID:5540 Public Health Surveillance Mechanisms, Applications, and Data 3 s.h.**

Introduction to fundamentals of public health surveillance with emphasis on cancer registration; use of resulting surveillance-based databases and information systems available to public health practitioners and researchers. Offered fall semesters. Prerequisites: EPID:4400.

#### **EPID:5550 Diagnostic Microbiology for Epidemiology 3 s.h.**

Introduction to microbiological culture, antigen detection, immunological and molecular amplification laboratory techniques for bacteria, viruses, parasites, fungi. Offered spring semesters. Prerequisites: MICR:2157 or MICR:3164.

#### **EPID:5560 Biomarkers in Epidemiology 3 s.h.**

Introduction to basic techniques of molecular biology (DNA, RNA, protein techniques) and their use in epidemiological research (e.g., diagnosis of disease, biomarker discovery, validation). Offered spring semesters of odd years. Corequisites: EPID:4400, if not taken as a prerequisite.

- EPID:5570 Zoonotic Diseases** 3 s.h.  
Introduction to epidemiology and control of zoonotic diseases; zoonoses endemic to the midwestern United States. Offered summer sessions. Prerequisites: EPID:5550 or EPID:6550 or MICR:2157 or MICR:3164.
- EPID:5580 Public Health Laboratory Techniques** 1 s.h.  
Common laboratory techniques in emerging infectious respiratory disease research and epidemiologic surveillance laboratories; emphasis on techniques for culturing, characterization, and serological surveillance of exposure to influenza viruses. Offered spring semesters. Requirements: completion of online Basic Biological Safety and Blood-Borne Pathogens courses; completed certificates must be brought to class.
- EPID:5600 Introduction to Epidemiology Data Management and Analysis** 3 s.h.  
Organization, collection, management, and analysis of epidemiological data using computer programs. Offered fall semesters. Corequisites: EPID:4400, if not taken as a prerequisite.
- EPID:5610 Intermediate Epidemiology Data Analysis With SAS and R** 3 s.h.  
Basic principles of data analysis and collaborative research; SAS fundamentals; data manipulation and interpretation techniques. Offered spring semesters.
- EPID:5900 Problems and Special Topics in Epidemiology** arr.  
Didactic material in epidemiology; may include tutorial, seminar, faculty-directed independent work (e.g. literature search, project, short research project); topics may include comparative effectiveness and patient-centered outcomes, neuroepidemiology, and epidemiology of aging.
- EPID:5925 Epidemiology Journal Club: Evaluating the Literature** 0-1 s.h.  
Critical evaluation of primary epidemiologic methods and research papers; informative, challenging, and current topics from scientific literature. Requirements: epidemiology MS, MPH, or PhD standing.
- EPID:5950 Preceptorship in Epidemiology** arr.  
Quantitative research-oriented project performed with a preceptor; preparation of prospectus, presentation of research results in a publication-quality report and a scientific poster session.
- EPID:6000 Independent Study in Epidemiology** arr.  
In-depth pursuit of an area of special interest in epidemiology requiring substantial creativity and independence.
- EPID:6050 Research in Epidemiology** arr.  
Research that may lead to a dissertation.
- EPID:6071 Theory and Methods in Social Epidemiology** 3 s.h.  
Application of social theory and methodological approaches to investigate relationships between social factors and health. Prerequisites: EPID:4400.
- EPID:6075 Health Equity, Disparities, and Social Justice** 3 s.h.  
Introduction to the concept of health equity and an overview of U.S. health disparities; students gain a better understanding of research and interventions through readings, lectures, reflection papers, in-class exercises, and research assignments. Same as CBH:6230.
- EPID:6100 Writing a Grant Proposal** 3 s.h.  
Small group projects to develop grant proposals using epidemiological study designs; presentation and defense of proposals before faculty site visitors. Offered fall semesters.
- EPID:6150 Writing for Medical Journals** 1 s.h.  
Skill development in writing medical journal articles for publication. Offered spring semesters.
- EPID:6200 Environmental and Occupational Epidemiology** 3 s.h.  
Overview of methods to interpret and perform environmental and occupational epidemiologic studies with focus on exposure assessment; valuable insights into identifying regional, national, global environmental, and occupational health-related issues. Prerequisites: EPID:4400. Same as OEH:6510.
- EPID:6330 Global Nutrition Policy** 2-3 s.h.  
Concepts and methods used in setting public health nutrition policy; evidence-based aspects of nutrition policy formation in public health settings; evaluation of nutritional public health policy implementation and ways of changing policy in China, Korea, Micronesia, Hawaii, Italy, and the United States. Offered spring semesters.
- EPID:6350 Nutritional Epidemiology** 2 s.h.  
Application of epidemiology study designs to nutrition variables and chronic disease; analysis of nutrition epidemiology studies; research protocol design. Offered spring semesters. Recommendations: a basic nutrition course.
- EPID:6360 Nutrition Intervention in Clinical Trials Research** 2 s.h.  
Nutrition interventions in clinical trials; disease related to nutrition variables; research that links effects of diet on chronic diseases. Offered fall semesters. Recommendations: a basic nutrition course.
- EPID:6370 Nutrition Intervention in Research Lab** 3 s.h.  
Development and demonstration of group counseling skills in ongoing nutrition research projects at the University of Iowa. Offered fall semesters. Corequisites: EPID:6360, if not taken as a prerequisite.
- EPID:6400 Epidemiology II: Advanced Methods** 4 s.h.  
Epidemiologic study design and analysis; bias, confounding, and effect modification; case-control studies; cohort studies; field methods; measurement principles; exposure and disease classification; acute and chronic disease examples. Offered spring semesters. Prerequisites: EPID:4400 and EPID:5600.
- EPID:6420 Survey Design and Analysis** 3 s.h.  
Methodological issues regarding design, sampling approach, implementation, analysis, and interpretation of surveys and questionnaires in public health research. Offered spring semesters of even years. Prerequisites: EPID:4400 and BIOS:5120. Same as BIOS:6420.
- EPID:6510 Injury Epidemiology** 3 s.h.  
How epidemiology can be applied to injury prevention and control: epidemiology literature, specific methodological problems involved in the epidemiology of injuries, critical evaluation of research articles. Offered spring semesters of odd years. Prerequisites: EPID:4400. Same as OEH:6520.
- EPID:6550 Epidemiology of Infectious Diseases** 3 s.h.  
Underlying epidemiological concepts of infection disease, including causation and surveillance; prevention and control; case studies. Offered fall semesters. Prerequisites: EPID:4400. Same as GHS:6550.

**EPID:6560 Hospital Epidemiology 2 s.h.**

Health care associated infections; surveillance, investigative methods, resistant organisms, and molecular epidemiology; methods for preventing spread of pathogens, including isolation precautions; environmental issues, construction, and sterilization; interactive exercises. Offered spring semesters of odd years. Prerequisites: EPID:4400.

**EPID:6570 Infectious Causes of Chronic Disease 3 s.h.**

Evidence linking various infectious agents with the development of different types of chronic disease. Offered spring semesters of even years. Corequisites: EPID:4400, if not taken as a prerequisite.

**EPID:6600 Epidemiology of Chronic Diseases 3 s.h.**

Chronic disease epidemiology; survey of leading chronic diseases including measurement of disease, lifestyle, nutrition, occupation, and family history. Offered spring semesters of even years. Prerequisites: EPID:4400.

**EPID:6620 Neuroepidemiology 2 s.h.**

Basic epidemiologic concepts of neurologic disease; concepts, methods, examples of neuroepidemiology; varied diseases, methods. Prerequisites: EPID:4400 and EPID:5600.

**EPID:6655 Causal Inference 3 s.h.**

Causal inference overview, emphasis on inference in observational research; conceptual issues (e.g., counterfactuals, causal graphs, time-varying treatments/confounding), methods (e.g., inverse probability weighting, doubly robust estimators), and related applications (e.g., causal mediation analysis, quantitative bias analysis); for advanced biostatistics or epidemiology students. Prerequisites: (BIOS:5720 and BIOS:5730) or (EPID:6400 and EPID:5241 and EPID:5610). Same as BIOS:6650, IGPI:6650.

**EPID:6900 Design of Intervention and Clinical Trials 3 s.h.**

Methodologic introduction to rationale and design of clinical trials; basics of clinical trial design, variety of designs, and examples from clinical trials. Offered fall semesters.

**EPID:6910 Pharmacoepidemiology and Comparative Effectiveness Research 3 s.h.**

Survey of methodological topics central to pharmacoepidemiology and comparative effectiveness research, including measures of treatment effects, clinical trial and observational study designs, treatment selection bias, covariate balancing methods, and claims database studies. Prerequisites: EPID:4400.

**EPID:6920 Applied Administrative Data Analysis 2 s.h.**

Concepts and methods for analysis of administrative health insurance claims data; focus on understanding types and sources of data, useful resources for classifying data, and applying SAS programming skills and common analytic approaches to studies using such data. Offered fall semesters. Prerequisites: EPID:5610 or BIOS:5310 or BIOS:5510. Requirements: EPID:5610 or BIOS:5310 or BIOS:5510 or SAS programming experience; and (concurrent or prior enrollment in BIOS:5120 and BIOS:5730) or (EPID:5241 and EPID:5610) or prior equivalent biostatistical coursework or experience.

**EPID:6950 Clinical Research Ethics 2-3 s.h.**

Ethical and regulatory aspects of clinical research; historical background, current regulations, and Institutional Review Board (IRB) requirements related to human subjects protection issues. Offered spring semesters. Requirements: K30 training grant or enrollment in degree program with clinical research project.

**EPID:7000 Thesis/Dissertation arr.****EPID:7200 Teaching in Epidemiology 3 s.h.**

Teaching methods in epidemiology; guided practicum experience in teaching epidemiology, in preparation for academic careers. Prerequisites: EPID:4400 and EPID:5600 and EPID:6400.

**EPID:7400 Epidemiology III: Theories 3 s.h.**

How epidemiology fits into the wider context of scientific inquiry. Offered fall semesters of odd years. Prerequisites: EPID:4400 and EPID:5241 and EPID:6400.