

**DEPARTMENT OF PUBLIC HEALTH SCIENCES COURSES
OFFERED BY QUARTER**

Autumn 2021

Epidemiology and Population Health

PBHS 30910

COURSE INSTRUCTOR: Diane Lauderdale

DAY & TIME: T/Th 3:30-4:50pm

PQ: STAT 22000 or other introductory statistics highly desirable.

CROSS-LIST ID: STAT 22810; ENST 27400; HLTH 20910; PPHA 36410

Epidemiology is the basic science of public health. It is the study of how diseases are distributed across populations and how one designs population-based studies to learn about disease causes, with the object of identifying preventive strategies. Epidemiology is a quantitative field and draws on biostatistical methods. Historically, epidemiology's roots were in the investigation of infectious disease outbreaks and epidemics. Since the mid-twentieth century, the scope of epidemiologic investigations has expanded to a fuller range non-infectious diseases and health problems. This course will introduce classic studies, study designs and analytic methods, with a focus on global health problems.

Introduction to Biostatistics

PBHS 32100

COURSE INSTRUCTOR: John Cursio

DAY & TIME: T/Th 11a-12:20p

PQ: 2 quarters of pre-calculus

CROSS-LIST ID: CCTS 45000

This course will provide an introduction to the basic concepts of statistics as applied to the bio-medical and public health sciences. Emphasis is on the use and interpretation of statistical tools for data analysis. Topics include (i) descriptive statistics; (ii) probability and sampling; (iii) the methods of statistical inference; and (iv) an introduction to linear and logistics regression.

****In addition to the course, there is a statistical computing workshop held on Wednesdays from 10-11:30am.***

Applied Regression Analysis

PBHS 32400

COURSE INSTRUCTOR:

DAY & TIME: T/Th

PQ: PBHS 32100 or STAT 22000 or equivalent

CROSS-LIST ID: STAT 22400 (Primary)

This course introduces the methods and applications of fitting and interpreting multiple regression models. The primary emphasis is on the method of least squares and its many varieties. Topics include the examination of residuals, the transformation of data, strategies and criteria for the selection of a regression equation, the use of dummy variables, tests of fit, nonlinear models, biases due to excluded variables and measurement error, and the use and interpretation of computer package regression programs. The techniques discussed are illustrated by many real examples involving data from both the natural and social sciences. Matrix notation is introduced as needed.

Multilevel Modeling

PBHS 33400

COURSE INSTRUCTOR: Don Hedeker

DAY & TIME: T/Th 9:30-10:50am

PQ: PBHS 32400 or PBHS 32410 and PBHS 32700 or consent of instructor.

CROSS-LIST ID: CHDV 32401

This course will focus on the analysis of multilevel data in which subjects are nested within clusters (e.g., health care providers, hospitals). The focus will be on clustered data, and several extensions to the basic two-level multilevel model will be considered including three-level, cross-classified, multiple membership, and multivariate models. In addition to models for continuous outcomes, methods for non-normal outcomes will be covered, including multilevel models for dichotomous, ordinal, nominal, time-to-event, and count outcomes. Some statistical theory will be given, but the focus will be on application and interpretation of the statistical analyses.

Statistical Applications

PBHS 33500

COURSE INSTRUCTOR: Robert Gibbons

DAY & TIME: M/W 1:30-2:50pm

PQ: PBHS 32400 or PBHS 32410 or equivalent, and PBHS 32600/STAT 22600, or PBHS 32700/STAT 22700 or equivalent; or consent of instructor.

CROSS-LIST ID: STAT 35800; CHDV 32702

This course provides a transition between statistical theory and practice. The course will cover statistical applications in medicine, mental health, environmental science, analytical chemistry, and public policy.

Lectures are oriented around specific examples from a variety of content areas. Opportunities for the class to work on interesting applied problems presented by U of C faculty will be provided. Although an overview of relevant statistical theory will be presented, emphasis is on the development of statistical solutions to interesting applied problems.

Foundations of Public Health

PBHS 34100

COURSE INSTRUCTOR: David Moskowitz

DAY & TIME: T/Th 5-6:20pm

PQ: MPH students only; or consent of instructor

This course provides an overview and introduction to the role, theories, and methods of health promotion and health behavioral science in addressing the public health needs of the 21st Century. The course will cover a wide range of topics including: the history of public health, the basic institutional and organizational structures created to monitor public health; socio-cultural factors in disease etiology and the role of social conditions and social policy in addressing critical public health problems; individual, group, and community strategies for health behavior change; and current issues (e.g., eHealth) in behavioral science for health promotion. The course provides students with the opportunity to critically analyze current literature and gain an understanding of health promotion, its evolution, underlying theories, applications, and effectiveness in promoting health and preventing illness.

Introduction to U.S. Health Policy and Politics

PBHS 35500

COURSE INSTRUCTOR: Loren Saulsberry

DAY & TIME: W 12:30-3:20pm

PQ: N/A

CROSS-LIST ID: HLTH 25500; SSAD 45011; PPHA 37720;

The purpose of this course is to introduce students to the concepts needed to critically evaluate U.S. health policy issues. The course will 1) provide an overview of the U.S. health system including its institutions, stakeholders, and financing mechanisms, 2) describe the politics of health and illuminate how the structure of our political system shapes health policy outcomes, and 3) offer a framework for assessing the critical features central to health policy debates. Building upon this knowledge, the course will conclude with a discussion of strategies for influencing the health policy process and how they might be employed in future leadership roles within the health sector.

DEPARTMENT OF PUBLIC HEALTH SCIENCES COURSES

Winter 2022

Epidemiologic Methods

PBHS 31001

COURSE INSTRUCTOR: Brian Chiu

DAY & TIME: T/Th 12:30-1:50pm

PQ: PBHS 30910 **and** PBHS 32400 or PBHS 32410 or applied statistics courses through multivariate regression or consent of instructor

CROSS-LIST ID: STAT 35700

This course expands on the material presented in "Principles of Epidemiology," further exploring issues in the conduct of epidemiologic studies. The student will learn the application of both stratified and multivariate methods to the analysis of epidemiologic data. The final project will be to write the "specific aims" and "methods" sections of a research proposal on a topic of the student's choice.

Regression Analysis for Health and Social Research

PBHS 32410

COURSE INSTRUCTOR: Jim Dignam

DAY & TIME: T/Th 11a-12:20p

PQ: PBHS 32100 or STAT 22000 or equivalent

CROSS-LIST ID: STAT 22401

This course is an introduction to the methods and applications of fitting and interpreting multiple regression models. The main emphasis is on the method of least squares. Topics include the examination of residuals, the transformation of data, strategies and criteria for the selection of a regression equation, the use of dummy variables, tests of fit. Stata computer package will be used extensively, but previous familiarity with Stata is not assumed. The techniques discussed will be illustrated by real examples involving health and social science data.

Introduction to Clinical Trials

PBHS 32901

COURSE INSTRUCTOR: Mei Polley

DAY & TIME: T/TH 2-3:20pm

PQ: PBHS 32100; STAT 22000; introductory statistics; or consent of instructor

CROSS-LIST ID: STAT 35201

This course will review major components of clinical trial conduct, including the formulation of clinical hypotheses and study endpoints, trial design, development of the research protocol, trial progress monitoring, analysis, and the summary and reporting of results. Other aspects of clinical trials to be discussed include ethical and regulatory issues in human subjects research, data quality control, meta-analytic overviews and consensus in treatment strategy resulting from clinical trials, and the broader impact of clinical trials on public health.

Applied Longitudinal Data Analysis

PBHS 33300

COURSE INSTRUCTOR: Don Hedeker

DAY & TIME: T/TH 9:30-10:50am

PQ: PBHS 32400 or PBHS 32410 or equivalent, and PBHS 32600/STAT 22600, or PBHS 32700/STAT 22700 or equivalent; or consent of instructor.

CROSS-LIST ID: STAT 36900; CHDV 32501

Longitudinal data consist of multiple measures over time on a sample of individuals. This type of data occurs extensively in both observational and experimental biomedical and public health sciences, as well as in studies in sociology and applied economics. This course will provide an introduction to the principles and methods for the analysis of longitudinal data. Whereas some supporting statistical theory will be given, emphasis will be on data analysis and interpretation of models for longitudinal data. Problems will be motivated by applications in epidemiology, clinical medicine, health services research, and disease natural history studies.

Health Communication & Health Behavior Theory

PBHS 34200

COURSE INSTRUCTOR: David Moskowitz

Day/Time: T/Th 3:30-4:50pm

PQ: **Limited to MPH Students; Consent of Instructor for PBHS Graduate and Doctoral Students**

This course addresses the psychological, social, and environmental determinants of a wide range of health and health-related behavior. Theoretical models from the behavioral and social sciences will be used to explain health behavior at the individual, interpersonal, and community levels. The course emphasizes the acquisition of theoretical understandings, but

also is intended to improve actions or activities undertaken for the purpose of promoting, preserving, or restoring wellness. Towards that end, students in this course will learn how to use peer-reviewed research and key social marketing principles to develop a comprehensive and effective social marketing campaign; learn how to target health communication efforts towards specific audiences and via varied channels of distribution; understand the role of social media and technology in facilitating/influencing behavior changes; study current examples of successful social marketing initiatives; and discuss the ethics surrounding health communication and social marketing efforts.

Computer Programming for Public Health

PBHS 34400

COURSE INSTRUCTOR: TBN

Day/Time: T/Th

PQ:

Qualitative Methods for Health Research

PBHS 34600

COURSE INSTRUCTOR: David Moskowitz

Day/Time: T/Th 2-3:20pm

PQ:

This course is designed to train students in qualitative research methodology, from conceptualization, through design and data collection processes. It includes an in-depth discussion of qualitative research design and the role of theory in guiding and informing a research project. Students will learn to delineate research problems and design considerations that are best suited for qualitative over quantitative methods. Specifically, the course focuses on training, through lecture, group work and hands-on experiences, across four data collection methods commonly used in qualitative research: observation, interview, focus group, and use of existing qualitative data. Students will undertake a pilot research study as a means of practicing their qualitative research conceptualization and data collection skills. Multiple data analyses techniques (e.g., content analysis, narrative analysis) will be explained.

Introduction to Health Economics

PBHS 38010

COURSE INSTRUCTOR: Tamara Konetzka

DAY & TIME: M/W 1:30-2:50pm

PQ: Microeconomics course

CROSS-LIST ID: HLTH 28010; PBHS 28010; PPHA 38290

This course covers the foundations of the economics of health care. Content includes demand for health, medical care, and insurance; supply of medical care and behavior of health care practitioners; and economic perspectives on measurement in health care research. Using a combination of lectures, readings, and problem sets, the goal is for students to acquire a basic understanding of economic knowledge and thinking that can be applied to current challenges in health care policy and practice. The course is open to undergraduate and graduate students with at least one prior course in microeconomics.

Applied Bayesian Modeling and Inference

PBHS 43010

COURSE INSTRUCTOR: Yuan Ji

DAY & TIME: T/Th 12:30-1:50pm

PQ: STAT 24400 and STAT 24500 or master level training in statistics.

CROSS-LIST ID: STAT 35920

Course begins with basic probability and distribution theory, and covers a wide range of topics related to Bayesian modeling, computation, and inference. Significant amount of effort will be directed to teaching students on how to build and apply hierarchical models and perform posterior inference. The first half of the course will be focused on basic theory, modeling, and computation using Markov chain Monte Carlo methods, and the second half of the course will be about advanced models and applications. Computation and application will be emphasized so that students will be able to solve real-world problems with Bayesian techniques.

Introduction to Causal Inference

PBHS 43201

COURSE INSTRUCTOR: Guanglei Hong

DAY & TIME: W 1:30-4:20pm

PQ: Intermediate statistics or equivalent such as PBHS 32400, PBHS 32410, PPHA 31301, BUS 41100 or SOCI 30005.

CROSS-LIST ID: CHDV 30102 (Primary)

This course is designed for graduate students and advanced undergraduate students from social sciences, education, public policy, public health sciences, social service administration, and statistics who are involved in quantitative research and are interested in studying causality. The course begins by introducing the notion of counterfactual outcomes and

various causal inference techniques that are comparatively new to most social scientists. A major emphasis will be placed on conceptualizing causal questions, comparing alternative research designs, and identifying the assumptions under which a causal effect can be estimated from non-experimental data. In addition to studying experimental, quasi-experimental, and non-experimental designs, students will become familiar with causal inference techniques suitable for evaluating binary treatments, concurrent multi-valued treatments, time-varying treatments, as well as moderated and mediated treatment effects in non-experimental data

Policy Analysis Methods and Applications

PBHS 45610

COURSE INSTRUCTOR: Harold Pollack

DAY & TIME: Th

PQ:

CROSS-LIST ID: SSAD 45600 (Primary); PPHA 40101

This course examines the intellectual bases and analytic tools for the professional practice of policy analysis, with an emphasis on economic policy analysis in the form of cost-benefit analysis, decision analysis, and cost-effectiveness analysis. Many examples will be drawn from medicine and public health, which offer particularly clear application of the basic methods. However we will also draw upon examples and challenges from environmental policy, criminal justice, transportation, and welfare policy.

Topics to be covered will include cost-benefit analysis, decision analysis, quality of life and cost measurement, model development and parameter estimation, and cost-effectiveness methods. Students will have weekly problem sets and instruction in a computer lab that will provide them with hands on experience performing decision analysis and cost-effectiveness analyses. Students taking this course will be prepared to take Advanced Applications of Cost-Effectiveness Analysis, which provides doctoral-level training in this area.

DEPARTMENT OF PUBLIC HEALTH SCIENCES COURSES

Spring 2022

Introduction to Infectious Disease Epidemiology

PBHS 31300

COURSE INSTRUCTOR: Maria Pyra

DAY & TIME: M/W 1:30-2:50pm

PQ: PBHS 30910 or Introductory Epidemiology or consent of instructor

CROSS-LIST ID: CCTS 43200; BIOS 25419; MEDC 31300

This intermediate-level course will build off basic epidemiology foundations to understand principles of infectious disease epidemiology as well as focus on specific diseases & their public health significance. We will examine disease transmission and the interactions between pathogens, hosts, and environment. This course introduces key pathogens, diagnostics, and immune responses. In addition, we will explore the roles of climate change, globalization, and social determinants of health on infectious diseases. Students will learn about research and public health responses to infectious diseases, including study design, modeling, molecular epidemiology, surveillance, outbreak investigation, and prevention

Social Inequalities in Health: Race/Ethnicity & Class

PBHS 31450

COURSE INSTRUCTOR: Aresha Martinez-Cardoso

DAY & TIME: T 3:30-6:20pm

PQ: Introductory statistics course.

CROSS-LIST ID: HLTH 27450

This course examines how social stratification and social inequality shape racial/ethnic and socioeconomic inequalities in health. In particular, we will explore the production of race and class inequality in the US and draw on the extant theoretical and empirical literature to understand how these social factors influence health behaviors and health outcomes. Finally, we will review both the classic and emerging methodological approaches used by public health and social scientists to measure and test how these features of society get “under the skin” to shape a variety of health outcomes.

Environmental Epidemiology

PBHS 31710

COURSE INSTRUCTOR: Brisa Aschebrook-Kilfoy

DAY & TIME: Th 3:30-6:20pm

This course provides an introduction to topics and methods in environmental epidemiology. Topical areas include selected air and water pollutants, radiation, pesticides, metals, environmental microbial exposures, persistent organic pollutants, endocrine-disrupting chemicals, disease clusters, disaster epidemiology, environmental justice, and climate change. Exposure assessment and statistical methods for evaluation of environmental and occupational factors will be considered in the context of specific applications

Genetic & Molecular Epidemiology

PBHS 31831

COURSE INSTRUCTOR: Brandon Pierce

DAY & TIME: T/TH 9:30-10:50am

PQ: PBHS 30700 or PBHS 30910 (or introductory epidemiology) AND HGEN 47000.

This course is designed for students with research interests related to identifying and characterizing the role of genetic and molecular factors in human disease risk and prognosis. Students will be introduced to the key concepts and methodological issues encountered in epidemiological studies that utilize genetic and molecular data. This course will train students on the theoretical and practical aspects of study design and data generation, and also provide the relevant hands-on training for quality control, management, and analysis of large-scale genomic/molecular data. Students are expected to have taken prior coursework in genetics as well as introductory statistics and/or epidemiology.

Global Health Metrics

PBHS 31900

COURSE INSTRUCTOR: Kavi Bhalla

DAY & TIME: T/Th 11a-12:20p

PQ: None

CROSS-LIST ID: PBHS 27900; HLTH 27905; PBPL 27905;

This course provides an overview of the causes of illness and injury in populations across the world and the most important risk factors. We will discuss how population health is measured using summary indicators that combine mortality and non-fatal health outcomes. We will use these indicators to compare and contrast the health of populations

across global regions and in time. Sound measurement of the global burden of disease is essential for prioritizing prevention strategies. Therefore, there will be a strong emphasis on understanding how data sources in information-poor settings are used to generate estimates of population health.

Biostatistical Methods

PBHS 32700

COURSE INSTRUCTOR: Lin Chen

DAY & TIME: T/Th 12:30-1:50pm

PQ: PBHS 32400, PBHS 32410 or STAT 24500; or equivalent; or consent of instructor

CROSS-LIST ID: STAT 22700

This course is designed to provide students with tools for analyzing categorical, count and time-to-event data frequently encountered in medicine, public health and related biological and social sciences. The course will emphasize application of the methodology rather than statistical theory, including recognition of the appropriate methods, interpretation and presentation of results. Methods covered include: contingency table analysis, Kaplan-Meier survival analysis, Cox proportional-hazards survival analysis, logistic regression, Poisson regression.

Public Health Programs: Planning, Implementation & Evaluation

PBHS 34300

COURSE INSTRUCTOR: David Moskowitz

DAY & TIME: M/W 10:30-11:50am

PQ: **Limited to MPH Students; Consent of Instructor for PBHS Graduate and Doctoral Students**

The course is designed to provide students with an overview of how to develop public health programs and interventions. Students will learn the best ways to help solve the critical health issues affecting our communities at local, national, and international levels. Students will learn the start-to-finish processes of public health programming including understanding the problem using existent data, needs assessments/surveillance, using goals/objectives, basic design, message construction, planning, implementation, and creating an evaluation system that links back to goals/objectives. The course will also include an overview of effective evidence-based public health interventions that span multiple health domains and delivery modalities. Students will have the opportunity to create their own health programs through the quarter.

Machine Learning in Public Health

PBHS 34500

COURSE INSTRUCTOR: Eric Polley

DAY & TIME: T/Th 2-3:20pm

PQ: PBHS 32410 or equivalent and PBHS 34400 or equivalent programming course

This course provides an introduction to machine learning in the context of public health and medical applications. Key concepts in the design and evaluation of machine learning algorithms will be presented. A variety of algorithms will be covered (e.g. random forests, splines, boosting, neural networks, and ensembles) and include hands-on experience with programming in R.

Health Services Research Methods

PBHS 35100

COURSE INSTRUCTOR: Prachi Sanghavi

DAY & TIME: M/W 1:30-2:50pm

PQ: At least one course in linear regression and basic familiarity with STATA; or consent of instructor.

CROSS-LIST ID: HLTH 29100; PPHA 38010; SSAD 46300;

The purpose of this course is to better acquaint students with the methodological issues of research design and data analysis widely used in empirical health services research. To deal with these methods, the course will use a combination of readings, lectures, problem sets (using STATA), and discussion of applications. The course assumes that students have had a prior course in statistics, including the use of linear regression methods.

Advanced Epidemiologic Methods

PBHS 40500

COURSE INSTRUCTOR: Dezheng Huo

DAY & TIME: M/W 10:30-11:50am

PQ: PBHS 31001

This course examines some features of study design but is primarily focused on analytic issues encountered in epidemiologic research. The objective of this course is to enable students to conduct thoughtful analysis of epidemiologic and other population research data. Concepts and methods that will be covered include: matching, sampling, conditional logistic regression, survival analysis, ordinal and polytomous logistic regressions, multiple imputation, and screening and diagnostic test evaluation. The course follows in sequence the material presented in "Epidemiologic Methods."