

# EPIDEMIOLOGY (EPID)

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## **EPID 6090 Epidemiology of Infectious Diseases (3)**

This course focuses students on the knowledge needed for the investigation, control, and prevention of a variety of infectious diseases. Students will explore the characteristics of a range of specific disease agents, compare their impact on populations, review approaches used to investigate disease outbreaks, and examine local and global efforts to monitor, control, and eradicate selected infectious diseases. Zoonotic and human-reservoir diseases are included in the course content.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860 and BIOS 6030, SPHL 6050 or 6850.

## **EPID 6210 Cancer Epidemiology (3)**

This course will explore current and historical trends in cancer incidence and mortality and evaluate the current state of the science regarding cancer etiology, detection, and treatment. Students will critically evaluate the methodological tools commonly employed in the practice of cancer epidemiology, and explore current controversies in the field, including the relative contributions of genes and the environment in cancer susceptibility, and the tradeoffs associated with cancer screening decisions. Students will develop an understanding of the known contributors to cancer risk and progression, and will appreciate the barriers to progress in cancer prevention and control.

**Prerequisite(s):** EPID 6030\*, SPHL 6060\* or 6860.

\* May be taken concurrently.

## **EPID 6220 Cardiovascular Disease Epidemiology (3)**

This is an introductory course designed to provide the student with a summary of the present knowledge of distribution, natural history, and risk factors for major cardiovascular diseases. Also, methodologic issues in epidemiologic studies unique to cardiovascular diseases will be discussed. The course format consists of lecture, discussion of current literature and the epidemiologic constructs as they are applied to population-based research of cardiovascular diseases.

**Prerequisite(s):** (EPID 6030\*, SPHL 6860 or 6060\*).

\* May be taken concurrently.

## **EPID 6230 Computer Packages for Epidemiology (3)**

This course consists of data management and data analysis using SAS and STATA. The student will learn to browse and create mock data in REDCap. The student will be able to get different formats of data into SAS and STATA, manipulate data, generate figures and tables for reports, run basic analyses, and interpret the result. This course will prepare the student with the technical skills necessary to complete subsequent quantitative course work such as EPID7120, 7130, and 7220.

## **EPID 6290 Genetic Epidemiology (3)**

This introductory course will cover fundamental concepts, terminologies and principles of human population genetics and molecular biology relevant to understanding approaches in genetic epidemiology. Study designs and analytical methods for genetic epidemiological studies of human disease in families and unrelated individuals will be discussed in detail. Issues related to genetic studies, such as genetic heterogeneity, population stratification and multiple testing will also be covered.

**Prerequisite(s):** EPID 6030\*, SPHL 6060\* or 6860 and BIOS 6030\*, SPHL 6050\* or 6850.

\* May be taken concurrently.

## **EPID 6320 Molecular Epidemiology (3)**

The course introduces the concepts, principles, and molecular tools used in epidemiologic research to evaluate both genetic susceptibility and the effects of environmental exposures underlying human disease. Class topics include: introduction to biomarkers of exposures, etiology and effect (including those used in infectious diseases) the theoretical advantages and limitations of biomarkers, criteria for evaluating and selection of potential markers, biological sample collection and storage (banking), methods for evaluation of gene-environment interactions, laboratory quality control considerations, issues in epidemiologic study design and analysis, ethical/legal concerns. Current methods and newly emerging technologies ('omics) will also be discussed.

**Prerequisite(s):** (EPID 6030, SPHL 6860 or 6060).

## **EPID 6340 Clinical and Translational Research Methods (3)**

This course is an introduction to clinical and translational research methods. Emphasis is placed on maximizing study internal and external validity for observational cohort studies, case-control studies and clinical trials. Selected topics covered include study design options, sources of bias, confounding, effect modification, data analysis techniques, measures of disease frequency, association, and causal inference, sampling methods, design, conduct, analyses, and interpretation of clinical trials, preparation and submission of manuscripts, and funding opportunities for support of clinical and translational research.

**EPID 6350 Implementation Science in Public Health (3)**

Implementation science is a rapidly growing field in public health that is focused on moving scientific findings from controlled settings into clinical practice and community settings. This course will introduce the concepts, theories, frameworks, and methods needed for implementing evidence-based interventions and programs in a variety of settings. Students will learn the role of implementation science from bringing public health research and practice closer together and will gain the skills needed to support implementation across health conditions and various real-world settings. Topics will include implementation strategies, frameworks, study designs, methods, measurements, evaluation, sustainability and the importance of stakeholder partnerships.

**Prerequisite(s):** (SPHL 6050\*, 6850 or BIOS 6030\*) and (SPHL 6060\*, 6860 or EPID 6030\*).

\* May be taken concurrently.

**EPID 6420 Clinical Epidemiology (3)**

This course will help students learn or refine the skills of clinical epidemiology, defined as the study and management of illness in individuals as well as populations using population methods. Individual and group sessions will develop techniques of constructive critical appraisal of the medical literature, illustrated by examples from general health, cardiovascular disease and diabetes. Students will learn how to assess studies of prognosis or outcomes of illness, treatments, diagnostic tests, and screening programs, as well as the basic requirements for randomized clinical trials.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860 and BIOS 6030, SPHL 6050 or 6850.

**EPID 6480 Reproductive Epidemiology (3)**

This course provides students analytical skills necessary to conduct epidemiological studies in reproductive health in human populations. Reproductive Epidemiology covers broad reproductive health issues from the pre-conception, prenatal, delivery and post-natal periods, and emphasizes health issues affecting both women and infants. Relevant methodological, clinical, policy and programmatic issues will be presented with practical illustrations from domestic and international settings. Students will be able to design a reproductive epidemiology study, discuss relevant methodological issues in reproductive health epidemiology studies, and apply reproductive/perinatal health data to improve reproductive programs and policy.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860 and BIOS 6030, SPHL 6050 or 6850.

**EPID 6490 Environmental Epidemiology (3)**

Environmental Epidemiology will introduce students to epidemiologic research designs and methods used to study health impacts of environmental exposures. The course will provide an overview of the major study designs used in environmental epidemiology, outcomes related to environmental exposure, challenges related to exposure assessment and policy-related issues.

**Prerequisite(s):** SPHL 6060.

**EPID 6500 Nutritional Epidemiology (3)**

Nutritional Epidemiology is a rapidly evolving field of epidemiologic research that utilizes highly specialized epidemiological methods to identify dietary and lifestyle factors that are related to human diseases especially non-communicable, chronic diseases such as obesity, diabetes, cardiovascular disease and cancer. This introductory course will cover fundamental concepts, terminologies and principles in Nutritional Epidemiology and analytical approaches particularly used in studying relations of dietary factors with human health. The lectures include study designs, nutritional assessment, and analytical methods for nutritional epidemiological studies in population-based settings such as case-control studies, cohort studies, and randomized clinical trials (RCTs). The course will also cover new advances in the fields of Nutritional Epidemiology, such as gene-diet interactions, metabolomics, epigenomics, and microbiome research.

**Prerequisite(s):** EPID 6030\*, SPHL 6060\* or 6860.

\* May be taken concurrently.

**EPID 6600 Social Epidemiology: Mechanisms of Disparities (3)**

This course will examine the major patterning of health related to social factors, including race, gender, and socioeconomic status. Effects from the microsystem (individual experience, family) to the macrosystem (neighborhood, community, nation) will be examined. Upon completion of the course, students will be familiar with how these factors affect health and the mechanisms by which health inequities are created.

**Prerequisite(s):** (SPHL 6050 or 6850 and SPHL 6060 or 6860) or (EPID 6030 and BIOS 6030).

**EPID 6750 Outbreak Epidemiology (3)**

This course is designed to provide students with the knowledge and skills required for the investigation, control and prevention of disease outbreaks in a variety of settings and due to a variety of infectious agents. Students will explore and practice the approaches used to investigate disease outbreaks, and examine local and global efforts to monitor, control and mitigate the effects of infectious disease outbreaks.

**Prerequisite(s):** (EPID 6030, SPHL 6860 or 6060) and (BIOS 6030, SPHL 6850 or 6050).

**EPID 7000 Departmental Seminar (0-1)**

The Epidemiology Seminar Series provides a forum in which faculty, guest faculty, and doctoral students present their research on topics relevant to epidemiologic principles, methods, and applications. Students who take this course for one credit will need to write a review article on one of the research topics presented during the semester. The review article should follow a scientific journal format (abstract, introduction, methods, results, discussion, tables, figures, and references). Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**EPID 7110 Spatial Epidemiology (3)**

This course introduces students to a range of spatial techniques in social epidemiology, including geospatial approaches to exposure and outcome measurement as well as analyses and integration between Geographical Information System (GIS) and traditional software packages. Students will apply problem solving abilities, critical thinking skills, and creative thinking to diverse examples of social and spatial epidemiology. Content will build upon existing GIS courses and will focus on teaching methods and interpretation of spatial analyses for research and programming, including emerging areas such as working with global positioning system (GPS) data or geotagged social media data. Non-content objectives are for students to develop a critical and creative approach to questions in public health which can benefit from spatial epidemiology.

**Prerequisite(s):** (EPID 6030, SPHL 6860 or 6060) and (BIOS 6030, SPHL 6850 or 6050).

**EPID 7120 Epidemiologic Methods II (3)**

This course is intended to enhance student understanding of observational epidemiologic research methods. The course emphasizes critical thinking and approaches to design, analysis and interpretation of observational studies. Emphasis is placed on maximizing study internal validity. Selected topics covered include measures of disease frequency, association, and impact; study design options, sources of bias, and data analysis techniques.

**Prerequisite(s):** (EPID 6030, SPHL 6860 or 6060) and (BIOS 6030, SPHL 6850 or 6050) and (EPID 6230, BIOS 6290 or SPHU 4160).

**EPID 7130 Observational Epidemiology (3)**

The goal of this course is to present the conceptual basis for the design, conduct, and analysis of cohort and case-control studies. The course will review the application of case-control and cohort studies in the context of epidemiological research and public health. Students will gain hands-on experience in designing and analyzing observational studies through classroom sessions and homework assignments. By the completion of the course, each student will have the skills to design, develop data collection methods for, and analyze data from case-control and cohort studies.

**Prerequisite(s):** (EPID 6030, SPHL 6860 or 6060) and (BIOS 6030, SPHL 6850 or 6050) and (EPID 6230, BIOS 6290 or SPHU 4160) and EPID 7120 and BIOS 6040.

**EPID 7160 Survey Methodology (3)**

This course is designed to prepare the student to undertake survey research addressing a wide variety of public health topics in national and international settings. Focus is on the collection of information from primary sources such as individuals or groups. Survey approaches include questionnaires for mail or group administration and personal interviews in institutional and household settings. Although attention is given to principles of overall research design, the major emphasis is on principles and techniques of data collection procedures including instrument design and preparation for analysis.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860 and BIOS 6030, SPHL 6050 or 6850.

**EPID 7170 Clinical Trials: Design, Conduct & Interpretation (3)**

This course covers various topics in the design, conduct, analysis and interpretation of clinical trials and uses published and on-going studies to illustrate these issues. Topics include the definition and history of clinical trials; trial designs, including phase I-IV, parallel, crossover, factorial, and large multicenter trials; internal and external validity; selection of intervention, control, and study population; randomization and masking; selection of trial outcome variables; data collection and quality control; ethical issues; data analysis principles; and issues related to publication and dissemination.

**Prerequisite(s):** (BIOS 6030, SPHL 6050 or 6850 and SPHL 6060, 6860 or EPID 6030).

**EPID 7210 Epidemiology of Sexual Health (3)**

This course is designed to provide students with the skills to conduct epidemiologic research in HIV and other sexually acquired infections. This course will cover the biology of these infections, methodological issues of surveillance, clinical and behavioral research and ethical aspects of the epidemiology of HIV/STI. Students meet experts in the field and learn of the most up-to-date issues and state-of-the-art epidemiologic methods surrounding HIV and other STIs.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860 and BIOS 6030, SPHL 6050 or 6850.

**EPID 7220 Analytic Epidemiology (3)**

This course is designed for doctoral students and advanced master students to help them develop data analysis, interpretation, and presentation skills. The course covers common statistical models for continuous, categorical and count data from both cross-sectional and longitudinal studies. Both parametric and semi-parametric models are covered. The statistical models are illustrated by case studies throughout the class. During this course, students will analyze data from several different studies and discuss advanced epidemiologic methods issues that one may encounter during data analysis with guidance from the professor. After successfully completing the course, students are expected to be able to conduct statistical analysis independently based on the type of outcome and study design, and interpret the results and present the findings.

**Prerequisite(s):** (EPID 6030, SPHL 6060 or 6860 and SPHL 6050, 6850 or BIOS 6030 and BIOS 6040, EPID 6230, 7120 and 7130).

**EPID 7310 Meta-Analysis (3)**

This course is designed to provide students with qualitative and quantitative skills to conduct meta-analysis. The course covers the formulation of study hypothesis, literature search, evaluation of study quality, and statistical methods for meta-analysis. In addition, the potential problems and biases in meta-analysis will be addressed.

**Prerequisite(s):** EPID 7120\* and BIOS 6030 or SPHL 6050 or 6850 and EPID 6030, SPHL 6060 or 6860.

\* May be taken concurrently.

**EPID 7410 Pharmacoepidemiology (2)**

This course provides an introduction to the concepts and methods of Pharmacoepidemiology through 30 in-class credit hours (including lecture, case studies, computer laboratory, group project and final exam). It begins with an overview of how epidemiology is applied to study the safety of drugs, medical devices and vaccines in academia, industry and regulatory agencies. Epidemiologic study designs, methodologies and techniques for pharmacoepidemiologic research, including commonly used data sources, are then discussed. Lastly, common biases and methodological challenges encountered in pharmacoepidemiology and approaches for addressing these are illustrated through case studies and computer laboratories.

**Prerequisite(s):** (EPID 6030 or SPHL 6060) and (BIOS 6030 or SPHL 6050) and EPID 7120.

**EPID 7810 Human Molecular Genetics (3)**

This course is designed to prepare students for the study of human health in the post-genome era. The goal of the course is to provide students the fundamental skills and knowledge on the molecular aspects of human genetics, the most current technologies, experimental design, interpretation of genetic data and the use of genomic information for the study of human disease. The information will be integrated into a big picture of how each component relates to human health both individually (precision medicine) and in a population perspective, relating genetic instability to genetic variation and disease risk. Cancer, gene therapy and stem cell research will be used as an example of disease-related questions.

**Prerequisite(s):** EPID 6030, SPHL 6060 or 6860.

**EPID 7990 Master's Independent Studies (1-3)**

Masters students and advisor select a topic for independent study and develop learning objectives and the expected written final product.

**EPID 8000 Doctoral Journal Club (0)**

This course is required for all doctoral students in the Department of Epidemiology until successful completion of the comprehensive exam and optional for the duration of their tenure as doctoral candidates. It is intended to increase students' knowledge in design, conduct, analysis, interpretation, and dissemination of epidemiologic studies. In journal club, students develop critical evaluation and discussion skills as they become familiar with epidemiologic literature. These discussions are a great way of preparing students for their comprehensive exam and to create an active research environment.

**Maximum Hours:** 99

**EPID 8300 Advanced Epidemiologic Methods (3)**

This course covers a wide variety of topics in epidemiological methodology. Topics will include concepts of epidemiological study design, causality in biomedical research, bias, confounding, interaction, and statistical modeling of epidemiology data. In addition, students will learn how to develop and critically review a research proposal and scientific articles.

**Prerequisite(s):** (EPID 6030, SPHL 6060 or 6860 and EPID 7120 and 7130).

**EPID 8990 Doctoral Independent Study (1-3)**

Doctoral students and advisor select a topic for independent study and develop learning objectives and the expected final written product.

**EPID 9910 Epidemiology Research Experience (0)**

MS students engaging in epidemiology research experience.

**EPID 9980 MS Thesis Research (0)**

MS Students engaging in thesis research. Course may be repeated up to unlimited credit hours.

**Course Limit:** 99