EPIDEMIOLOGY AND BIOSTATISTICS

Department Website (http://www.sph.sc.edu/epid_bios/default.htm)

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Achieving gains in improving the public's health depends on the ability to identify and solve community health problems. As measurement and research sciences, epidemiology and biostatistics are critical disciplines for the ascertainment and characterization of public health problems. and generating public health action. Combining epidemiology and biostatistics in the same department creates synergies in education and research. However, the two disciplines are unique and thus the Department is comprised of two divisions: the Division of Biostatistics and the Division of Epidemiology.

The Department of Epidemiology and Biostatistics offers the following degrees: Master of Public Health (M.P.H.) (Epidemiology only), Master of Science (M.S.)*, and Doctor of Philosophy (Ph.D.).

Program in Epidemiology

The major in epidemiology is designed for students pursuing careers in the study of patterns of diseases, disabling conditions, and other indicators of health in human populations. The field of epidemiology involves the study of the distribution and determinant of health and disease in human populations, and the application of this knowledge to better prevent and treat disease. Epidemiologists attempt to establish the causes of disease by describing the biological, environmental, social, and behavioral factors affecting illness and premature death, as well as factors that contribute to health and well-being. The evidence generated from epidemiologic research is translated into developing health promotion/disease prevention programs. and formulating health policy. Being an effective epidemiologist requires skills in working in interdisciplinary teams., both in leadership and collaborative roles, whether these teams. are focused on advancing research or public health practice.

Master of Public Health (M.P.H.) in Epidemiology (43 Hours)

Our Master of Public Health (M.P.H.) degree students learn in a multi-faceted educational program; this includes an integrated core curriculum, epidemiologic and biostatistical methods, and experience and training in a public health practice setting.

Master of Science (M.S.) in Epidemiology (43 Hours)

The Master of Science (M.S.) degree is designed for those who wish to acquire skills necessary for doing public health or biomedical research and want to focus on developing research skills for clinical research or the study of determinants of disease and other health-related outcomes. If you intend to further your study by pursuing a Ph.D. in Epidemiology, you will want to choose the M.S. rather than the M.P.H. degree.

Program in Biostatistics

The program in biostatistics is designed for individuals who wish to pursue careers in community health measurement, design and management of health data systems, and the development and application of quantitative methods to health problems. Biostatisticians apply statistical theory, methods, and techniques to the planning, development, and evaluation of health programs and problems. They collect and analyze various types of information; these include demographic and vital statistics, social and business data, health resources statistics, and other forms of social and economic data which are relevant to modern health problems. Biostatisticians design experiments and observational studies, use various computer operating systems and software packages to store and analyze data, develop methods to compare population groups, and prepare inferential and probabilistic statements based on biological, social, and environmental data. Biostatisticians are the theoretical researchers and applied statisticians of public health.

Programs Overview

Doctoral and master's students in programs in the Department of Epidemiology and Biostatistics gain state-of-the-art knowledge and skills that empower them to function effectively and appropriately in identifying, evaluating, and solving public health problems. Upon completion of the program, the students demonstrate:

- knowledge base of the etiology of disease, disability, and other health conditions
- application of epidemiologic and biostatistical methods in identifying the determinants of disease, disability, and other health conditions
- understanding of the design and conduct of research in public health
- skill in data management and analysis and interpretation of research results in studies to describe the distribution of disease, determinants of disease, and clinical trials to advance disease prevention, screening, and treatment.

Departmental faculty are actively involved in research projects funded by the federal government and other sources. Faculty also contribute their expertise to address public health challenges and contribute to health policy at the local, state, national, and global level. Our degree programs. are designed to help students achieve their career goals, whether the goals are an academic research career or a career in public health practice, and whether the preferred setting is in the public sector or in the private sector (such as health systems., pharmaceutical industry, etc.)

Master's Degrees
Epidemiology

The broad objective of the M.P.H. with a major in epidemiology is to prepare an individual to apply epidemiologic skills in a public health setting. The M.S. with a major in epidemiology focuses on the development of basic research skills for the study of correlates and determinants of disease and other health conditions. Students in both M.P.H. and M.S. programs:

- develop an understanding of the integration of epidemiologic research methods into the principles and philosophy of public health
- develop knowledge of the basic epidemiology of commonly studied diseases and other health conditions and health promoting behaviors
- describe the natural history, biology/pathophysiology, risk factors, methods unique to the specific situation, and strategies for disease prevention and control for several diseases or health conditions or health promoting behaviors
- apply descriptive and analytic epidemiologic methods to investigate and identify factors associated with various health conditions
- understand statistical procedures commonly used in public health research and evaluation

- develop expertise in computer applications and usage necessary for successfully managing or conducting epidemiologic studies
- demonstrate ability to manage and summarize health-related data and statistics and to calculate and appropriately interpret associations and their relevance to public health
- develop skills in presenting demographic, statistical, programmatic, and scientific data accurately and effectively for professional and lay audiences.

In addition, the M.P.H. student will develop an understanding of concepts, methods of implementation, and evaluation of health surveillance systems and demonstrate the ability to integrate epidemiologic concepts and analytic approaches to the study of a specific health problem by working with a mentor in a practice setting, preparing a written report, and giving an oral presentation to professionals who will be using the information generated. The M.S. student will demonstrate the ability to synthesize the current state of knowledge of a specific problem, critically evaluate findings, develop appropriate research questions to advance the field, and develop and implement a simple research protocol aimed at testing an epidemiologic hypothesis or estimating an effect of a risk factor on a health outcome and report results in a form suitable for dissemination to the scientific community. Both the M.P.H. and the M.S. require a minimum of 43 hours.

Biostatistics

The broad objective of the M.S. with a major in biostatistics provides the biostatistical concepts, principles, and skills necessary for scientific inquiry into health conditions and related methodologic developments. Students in both programs develop the capacity to:

- demonstrate the ability to evaluate a given health-related problem and to identify the most appropriate statistical technique for analysis
- display mastery of a variety of traditional and newly developed statistical techniques, including multivariable methods for continuous and categorical data analysis
- demonstrate the ability to interpret the results of a statistical analysis and to communicate such interpretations in an easily comprehendible manner
- demonstrate knowledge of academic and non-academic issues and problems in epidemiology and biostatistics
- demonstrate the ability to structure available data in an easily useable form using a variety of data management software tools
- demonstrate the ability to use a variety of statistical software packages, to create and maintain databases, and to analyze data

Students in the M.S. program will demonstrate the ability to work independently in a research problem outside of the classroom setting, and demonstrate the ability to modify and extend existing statistical techniques to answer questions posed by health related situations, and to synthesize such research results into acceptable research papers.

Master of Public Health (M.P.H.) in Epidemiology (43 Hours)

Our Master of Public Health (MPH) degree students learn in a multi-faceted educational program; this includes an integrated core curriculum, epidemiologic and biostatistical methods, and experience and training in a public health practice setting. In Fall 2019, the Arnold School of Public Health will launch our exciting redesigned MPH programs integrated across the public health disciplines. More details are available at here (http://sph.sc.edu/mph/).

Master of Science (M.S.) in Epidemiology (43 Hours)

The Master of Science (M.S.) degree is designed for those who wish to acquire skills necessary for doing public health or biomedical research and want to focus on developing research skills for clinical research or the study of determinants of disease and other health-related outcomes. If you intend to further your study by pursuing a Ph.D. in Epidemiology, you will want to choose the M.S. rather than the M.P.H. degree.

Master of Science (M.S.) in Biostatistics (54 Hours)

The Master of Science (M.S.) degree in Biostatistics prepares students for involvement in biostatistical research, including applying statistical theory to health problems, formulation of designed population and clinical intervention trials, and adapting existing statistical theory to address newly emerging health-related problems.

Doctoral Degrees

The Doctor of Philosophy is an advanced graduate research degree designed for those who intend to pursue teaching and research careers. The major objective of the Ph.D. degree with a concentration in epidemiology is to prepare an individual to pursue original epidemiologic investigation of diseases of unknown etiology and other health conditions or health behaviors and develop novel methodological approaches. The major objective of the Ph.D. program with a concentration in biostatistics is to prepare an individual to develop and apply biostatistical principles and methods to public health problems.

Doctor of Philosophy (Ph.D) in Epidemiology (Minimum of 42 Hours)

The Doctor of Philosophy (Ph.D.) is an advanced graduate degree for those who intend to pursue teaching and research careers. The major objectives are to prepare you to:

1. pursue original epidemiologic research,
2. develop novel methodological approaches,
3. teach epidemiologic methods courses, and
4. consult with non-epidemiologists in a collaborative research setting.

Doctor of Philosophy (Ph.D.) in Biostatistics (54 Hours)

The Doctor of Philosophy (Ph.D.) degree in Biostatistics prepares students for involvement in teaching and independent and collaborative biostatistical research; trains researchers to teach and to pursue original research on analytical approaches to investigating health conditions; and to develop novel biostatistical approaches.

Dual Ph.D. Degree Program in Epidemiology and Environmental Health Sciences

The Department of Epidemiology and Biostatistics and the Department of Environmental Health Sciences jointly offer a dual Doctor of Philosophy (Ph.D.). Students explore the unique set of requirements in relation to study design, bias, measurement of environmental exposures, and measurement of environmental-related health outcomes. The dual Ph.D. requires course work in epidemiology and environmental health sciences selected by the student in consultation with a joint epidemiology/environmental health sciences advisory committee, and successful completion of dissertation research on a topic spanning both disciplines. The successful applicant will have a faculty member in both departments who has agreed to be his/her mentor, and he/she will have a research area of Interest for which we have faculty expertise in both departments. Detailed program requirements for this highly competitive, rigorous dual degree program are available upon request.

Program Requirements for Epidemiology Degree Programs

A graduate student handbook and a list of specific courses needed to meet these requirements are available in the department.

Program Requirements for Biostatistics Degree Programs

A graduate student handbook and a list of specific courses needed to meet these requirements are available in the department.

Department Admission Requirements

Masters Admission Requirements

Departmental courses are sequenced so that students should begin their program of study in the fall semester. However, applications for spring admission will be accepted.

Applicants to the Master of Science (M.S.) program must have a baccalaureate degree in arts, science or medicine. Applicants should also have completed with a B or greater Calculus-2 and Matrix or Linear Algebra. Prior professional work experience is considered an asset but is not a requirement.

Students admitted to the M.S. program who do not have academic or professional experience that provides a strong understanding of the biological basis of public health are strongly encouraged to select courses that will provide this understanding.

Doctoral Admission Requirements

Departmental courses are sequenced so that students may begin their program of study in the fall or spring semester. Applications for summer admission will also be accepted.

For the Doctor of Philosophy (Ph.D.) program, preference for admission is given to applicants with breadth and depth of academic preparation in Biostatistics, Statistics, or a closely related field. Applicants must have a master's degree in one of these areas, or a master's degree in some other field and experience in these areas. Applicants should also have completed with a B or greater Vector Calculus and Matrix or Linear Algebra.

Programs

- Biostatistics, Certificate (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/biostatistics-certificate/)
- Biostatistics, M.S. (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/biostatistics-msph/)
- Biostatistics, Ph.D. (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/biostatistics-phd/)
- Epidemiology, M.P.H. (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/epidemiology-mph/)
- Epidemiology, M.S. (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/epidemiology-msph/)
- Epidemiology, Ph.D. (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/epidemiology-phd/)
- Maternal and Child Health, Certificate (https://academicbulletins.sc.edu/graduate/public-health/epidemiology-biostatistics/maternal-child-health-certificate/)

Courses

BIOS 700 - Introduction to Biostatistics (3 Credits)
Health-related statistical applications. Descriptive statistics, probability, confidence intervals, hypothesis testing, regression, correlation, ANOVA. May not be used as part of a degree program in epidemiology or biostatistics. Three lecture hours and one laboratory hour per week.

BIOS 701 - Concepts and Methods of Biostatistics (3 Credits)
Descriptive and inferential statistical applications to public health. Probability, interval estimation, hypothesis testing, measures of association. Three lecture hours and one laboratory hour per week. Intended for those who will be involved in research applications of biostatistics.

BIOS 709 - Basic Software for Public Health (1 Credit)
Working with public health data using statistical software. Effective ways to store, clean, merge, and format public health data for analysis.

BIOS 710 - Effective Data Management for Public Health (3 Credits)
Statistical data management techniques. Microcomputer applications, communication between microcomputers and mainframe, tape and disk storage, access of large health-related databases.
Prerequisite or Corequisite: BIOS 700.

BIOS 711 - Introduction to R Programming (1 Credit)
Students will learn the software program R for performing data management. The course covers basic to advanced commands for properly formatting output, merging data, working with functions, graphing, using programming loops for preparing data for analysis for public health data.

BIOS 712 - Introduction to Stata Software (1 Credit)
Students will learn the software program Stata for performing data management. The course covers basic to advanced commands for properly formatting output, merging data, working with functions, graphing, using programming loops for preparing data for analysis for public health data.

BIOS 714 - Introduction to MS Access for Public Health (1 Credit)
This course focuses the uses of Microsoft Access for data management in public health. The course takes the student through building tables, forms, queries, reports and finishes with automated scripts for each of use with Access.

BIOS 719 - Advanced SAS Methods for Public Health (1 Credit)
This course focuses on advanced programming for managing and analyzing data using SAS. Building upon skills learned in BIOS 709 (Introduction to SAS), students will learn data management using PROC SQL. Students will also become familiar with the SAS Macro Language which prepares data for conducting efficient statistical analysis.

BIOS 720 - Advanced Data Management in Public Health (3 Credits)
This course teaches advanced techniques for creating and using large data sets. Students will learn advanced techniques for working with data, cleaning data, and preparing it for analysis using three software packages (SAS, STATA, MS Access) for data entry, data management, and presentation. For statistical analysis, students will learn advanced SAS, the primary statistical package used for data analysis in other biostatistics and epidemiology courses.
Prerequisites: C or better in BIOS 710.

BIOS 735 - Machine Learning for Public Health Applications (3 Credits)
This course introduces the fundamental concepts and applications of machine learning (ML) in the context of public health, biostatistics, and related fields (e.g., epidemiology, psychology, neuroscience, genetics). Students will learn how to prepare data, select and implement appropriate machine learning methods, and evaluate model performance—all using R. Emphasis will be placed on conceptual understanding, practical implementation, and interpretation of results rather than on mathematical derivations. By the end of the course, students will be prepared to incorporate ML techniques into their own research projects, with a special focus on the unique challenges and ethical considerations inherent in analyzing public health data.
Prerequisites: B or better in BIOS 757and BIOS 755 or equivalent.

BIOS 745 - Seminar in Biostatistics (1-2 Credits)
Analysis of current and prospective issues in biostatistics, including historical foundations. Includes student exploration of unsolved problems and examination of central issues in biostatistics.

BIOS 746 - Introduction to Complex Survey Data Analysis (1 Credit)
Students will learn the basics of data collection methods, sampling design for linear, logistic, and survival analysis complex models using survey data. Students will also learn about weight adjustments, imputation methods with an emphasis on both applied models and the theory behind them.
Prerequisites: B or better in STAT 512 and STAT 513 or equivalent.

BIOS 753 - Community Health Studies (3 Credits)
Process, skills, and management of undertaking health studies in the human community.
Prerequisites: BIOS 700, EPID 700.

BIOS 754 - Discrete Data Analysis (3 Credits)
Analysis of discrete data in public health studies. Relative risk, odds ratio, rates and proportions, contingency tables, logistic regression, introduction to other advanced topics. Not for biostatistics majors.
Prerequisites: EPID 701, BIOS 710, BIOS 757.

BIOS 755 - Introduction to Longitudinal Data Analysis (3 Credits)
Introduction to principles and methods for longitudinal & multi-level modeling. Focus on data analysis and interpretation.
Prerequisites: BIOS 757.

BIOS 757 - Intermediate Biostatistics (3 Credits)
Public health applications of correlation, regression, multiple regression, single and multi-factor analysis of variance and analysis of covariance.
Prerequisites: a course in introductory statistics.

BIOS 758 - Advanced Linear Models in Biostatistics (3 Credits)
Public health applications of correlation, regression, multiple regression, single and multi-factor analysis of variance and analysis of covariance. Additional topics in analysis of health data including regression diagnostics, multi-collinearity of observational data, ridge/nonlinear regression, principal components, random/mixed effects, unbalanced designs, repeated measures and sampling and design effects.
Prerequisites: BIOS 701.

BIOS 759 - Theory and Methods of Discrete Data Analysis (3 Credits)
The concepts, principles, and biostatistical techniques necessary to analyze categorical epidemiological data including dose response curves, life tables, and discrete measures of association. Estimation of parameters for logistic and other commonly used epidemiological models.
Prerequisites: EPID 701, BIOS 757.

BIOS 760 - Biostatistical Methods in Clinical Trials (3 Credits)
The basic and advanced statistical techniques necessary for the design, conduct, analysis, and interpretation of results of clinical trials.
Prerequisites: EPID 741, BIOS 757.

BIOS 761 - Survival Analysis (3 Credits)
Methods for the analysis of survival data in the biomedical setting. Underlying concepts; standard parametric and nonparametric methods for one or several samples; concomitant variables and the proportional hazards model.
Prerequisites: BIOS 757 or BIOS 758.

BIOS 762 - Biostatistical Modeling of Genomic Data (3 Credits)
This course is an introduction to important topics and key concepts in statistical genetics, with emphasis on statistics methods and their applications to human complex diseases. The course will cover major concepts and classical statistical methods for the analysis of family and population based human genetic data.
Prerequisites: BIOS 757 or equivalent.

BIOS 765 - Research Design in the Biomedical Sciences (3 Credits)
Fundamentals of constructing, analyzing, and interpreting biomedical studies; internal and external validity, sample size determination, completely random designs, blocking crossover designs, factorial designs, confounding, nested designs, repeated measure designs.
Prerequisites: EPID 741, BIOS 757.

BIOS 767 - Spatial Statistics for Public Health (3 Credits)
Spatial statistics methods commonly used in public health including mapping, tests for spatial correlation, hypothesis tests for spatial clustering, and regression models with spatial random effects.
Prerequisites: B or better in BIOS 700 or BIOS 701.

BIOS 770 - Applied Longitudinal Data Analysis (3 Credits)
Modern methods for the analysis of repeated measures, correlated outcomes, and longitudinal data, including repeated measures ANOVA, generalized linear models, random effects, and generalized estimating equations.
Prerequisites: BIOS 757 or BIOS 758 or STAT 701 or STAT 705.

Cross-listed course: STAT 771

BIOS 775 - Biostatistical Aspects of Bioinformatics (3 Credits)
Bioinformatics analyses related to public health and biomedical research. Gene-gene and gene-environment interaction, phylogeny analysis in disease classification, and clustering for expression data. Data analyses, simulation studies, algorithms, and interpretation of health data.
Prerequisites: BIOS 757.

BIOS 780 - Introduction to Quantile Regression (3 Credits)
Principles and methods of quantile regression, a robust and distribution-free statistical approach that extends the classical mean regression to the analysis of complex treatment effects.
Prerequisites: BIOS 757.

BIOS 790 - Independent Study (1-6 Credits)
Directed research on a topic to be developed by M.P.H. or M.S.P.H. student and instructor. May be repeated.

BIOS 794 - Selected Topics in Biostatistics (1-6 Credits)
Content varies by title. Course may be repeated for a total of 6 credit hours.

BIOS 799 - Thesis Preparation (1-9 Credits)

BIOS 811 - Survival Analysis II (3 Credits)
Parametric survival analysis, accelerated failure time model, frailty model, competing risk mode and multi-state model. Techniques motivated by applications in epidemiology and clinical medicine research, applications demonstrated using public health data sets.

BIOS 815 - Generalized Linear Models (3 Credits)
Statistical theory and applications extending regression and analysis of variance to non-normal data. An integrated treatment encompassing logistic and other binary regressions, log-linear models, and gamma regression models.
Prerequisites: STAT 713 or STAT 513 and STAT 705 or BIOS 757.

Cross-listed course: STAT 775

BIOS 816 - Advanced R Programming in Public Health (3 Credits)
R is a free and open source software environment for statistical computing and graphics. This course provides the principles and techniques to efficiently design, implement, and execute simulation and data analysis routines in quantitative fields like biostatistics, statistics, engineering, finance, and data science.
Prerequisites: BIOS 711.

BIOS 818 - Advanced Computational Statistics for Signal and Network Analysis (3 Credits)
An overview of advanced computational statistics for signal and network analysis with a wide variety of social, genomic and neuroscientific applications. All course modules include a hands-on component.
Prerequisites: B or better in BIOS 701, BIOS 757, BIOS 711, STAT 512 and STAT 513.

BIOS 820 - Bayesian Biostatistics and Computation (3 Credits)
Bayesian statistical methods including hierarchical modeling and the use of the Markov Chane Monte Carlo (MCMC) methods.
Prerequisites: STAT 705 or BIOS 757.

BIOS 822 - Statistical Methods in Spatial Epidemiology (3 Credits)
A comprehensive introduction to the statistical methods used in the analysis of geo-referenced spatial health data. Topics range from disease mapping to prospective surveillance.
Prerequisites: BIOS 757 and BIOS 759.

BIOS 825 - Multivariate Biostatistics (3 Credits)
Analysis of multivariate data as found in biomedical studies: multivariate linear models, principal component analysis, factor analysis, discriminant and cluster analysis. Other special multivariate topics such as principal component regression.
Prerequisites: STAT 516 or BIOS 757.

BIOS 835 - Biostatistical Machine Learning for Public Health (3 Credits)
The focus of this course will be on using biostatistical models to predict and provide information on complex public health datasets. We will focus more on prediction of outcome(s) than estimation of the impact of a risk factor. However, some interferential methods for risk factors will be reviewed and (for all methods) techniques to measure variable importance will be discussed. Further, unsupervised learning methods (e.g., clustering) will be discussed. Prediction and predictive inference will be main themes in the course along with learning how to implement the methods in R software. See the syllabus course schedule for a full list of topics.
Prerequisites: B or better in BIOS 770 or equivalent.

BIOS 845 - Doctoral Seminar (1-3 Credits)
May be repeated for credit.
Prerequisites: complete at least one semester of course work and consent of instructor.

BIOS 850 - Binary Dose Response Theory and Methods (3 Credits)
Threshold, mass action and target theory; empirical dose response functions; methods in current use among health science researchers.
Prerequisites: STAT 512.

BIOS 890 - Independent Study (1-3 Credits)
Directed research on a topic to be developed by doctoral student and instructor. May be repeated.

BIOS 894 - Selected Topics in Biostatistics (3 Credits)
Discussion on current and emerging issues in biostatistics.

BIOS 898 - Doctor of Public Health Practicum (1-6 Credits)
Students are required to conduct applied public health methods and strategies as a part of their practicum experience. In particular, the student should successfully implement and interpret the results of biostatistical methods in the organization.

BIOS 899 - Dissertation Preparation (1-12 Credits)
Prerequisite: one full year (18 hours) of graduate study beyond the master's level.

EPID 542 - Global Health Epidemiology (3 Credits)
This course will introduce epidemiologic concepts and methods using cases studies examining current global health challenges. Students will gain an understanding of the role of epidemiology in understanding the distribution of disease and risk factors, and developing, implementing and evaluating public health interventions globally.

EPID 594 - Special Topics in Epidemiology (1-6 Credits)
This course will introduce epidemiologic concepts and methods using cases studies examining current global health challenges. Students will gain an understanding of the role of epidemiology in understanding the distribution of disease and risk factors, and developing, implementing and evaluating public health interventions globally.

EPID 661 - Parasitology (4 Credits)
Parasites of biological, economic, and public health importance. Three lecture and three laboratory hours per week.
Prerequisites: 300 level Biology course or equivalent.

Cross-listed course: BIOL 531, ENHS 661

EPID 700 - Introduction to Epidemiology (3 Credits)
Principles of epidemiology with examples of selected health problems. Health status of populations and conceptual tools for translating epidemiologic findings into public health action. May not be used as part of a degree program in epidemiology or biostatistics.

EPID 701 - Concepts and Methods of Epidemiology (3 Credits)
Conceptual foundation of epidemiologic research, quantitative methods, and epidemiologic study design. Intended for those who will be involved in epidemiologic research.
Prerequisite or Corequisite: BIOS 701.

EPID 721 - Clinical and Population Research Protocol Development and Implementation (2 Credits)
The purpose of this course is to develop applied research skills related to the development of appropriate data collection protocols for a given public health issue and context.

EPID 722 - Scientific Writing and Appraisal of Epidemiologic Studies (2 Credits)
This course will familiarize students with techniques used to critically assess, interpret, evaluate, and synthesize epidemiologic literature. Students will be introduced to research databases, reference management software, reporting guidelines, and methods for systematic reviews. Students will learn how to effectively communicate research finding via manuscript and oral or poster format.
Prerequisites: EPID 701, PUBH 725 or equivalent. The instructor reserves the right to waive course requirements or consider

Corequisite: in special cases.

EPID 725 - Biologic Basis of Public Health (3 Credits)
Survey of the biology of human disease processes at cellular, tissue and body system levels: application of biological principles to contemporary public health problems.

EPID 730 - Public Health Surveillance Systems (3 Credits)
Introduction to the concepts, implementation, and evaluation of surveillance systems to monitor the health of human populations.
Prerequisites: EPID 701, PUBH 725, or equivalent course.

EPID 741 - Intermediate Epidemiologic Methods (3 Credits)
Application of epidemiologic methods to current health problems through analysis of secondary data. Strategies for investigating etiologic hypotheses, assessment and control of confounding.
Prerequisites: EPID 701, PUBH 725, or equivalent.

Prerequisite or Corequisite: BIOS 757, BIOS 758 and BIOS 709, BIOS 710.

EPID 743 - Nosocomial Disease Control (3 Credits)
Specialization in the identification of potential or existing health hazards in institutional settings of the health care system; and includes instruction in the application of scientific knowledge to the daily routines in the implementation of appropriate control behaviors. Two lecture and three laboratory hours per week.
Prerequisites: BIOS 700, EPID 700, EPID 742.

EPID 744 - Cardiovascular Disease Epidemiology (3 Credits)
Epidemiology of selected groups of cardiovascular diseases (CVD) including etiology, pathophysiology, identification and description of events of CVD, and outcomes.
Prerequisites: EPID 701, PUBH 725.

EPID 745 - Seminar in Epidemiology (1-2 Credits)
Analysis of current and prospective issues in epidemiology, including historical foundations. Includes student exploration and critical consideration of current research and unsolved problems in epidemiology.

EPID 746 - Cancer Epidemiology (3 Credits)
Epidemiology of selected cancers in humans, including etiology, pathophysiology, identification and description of events of cancer and outcomes.
Prerequisites: EPID 701, PUBH 725 or equivalent. The instructor reserves the right to waive the prerequisite or consider

Corequisite: in special cases.

EPID 747 - Environmental Epidemiology (3 Credits)
Emphasis on the epidemiology of selected environmental factors which may affect human health including the identification of health hazards and methods of investigation. Two lecture and three laboratory hours per week.
Prerequisites: EPID 700, BIOS 700.

EPID 749 - Infectious Diseases Epidemiology (3 Credits)
Introduction to Principles of Epidemiology and Control of Infectious Disease. Focus will be on selected bacterial, viral, parasitic, and fungal diseases of public health importance locally, nationally and globally.
Prerequisites: EPID 701, PUBH 725, or equivalent course; BIOS 700/ BIOS 701 or consent of instructor. The instructor may waive course requirements or consider the need for

Corequisite: in special cases.

EPID 750 - Methods in Infectious Disease Epidemiology (3 Credits)
Quantitative methods for the study of infectious disease dynamics, including study design and analysis, mathematical modeling, computer simulation, and phylogenetic inference.
Prerequisites: EPID 741 and EPID 749.

EPID 751 - Sexually Transmitted Diseases: Their Epidemiology and Control (3 Credits)
A study of the epidemiology of the various sexually transmitted diseases and their complications, with emphasis on their prevention and control.
Prerequisites: EPID 700 and BIOS 700.

EPID 752 - Epidemiology and Control of Parasitic Diseases of Public Health Importance (3 Credits)
Study of major parasitic diseases of public health importance. Emphasis on epidemiologic principles and patterns of human morbidity and mortality. Analyzes and evaluates various approaches in prevention and control programs.
Prerequisites: EPID 700, BIOS 700, and ENHS 661.

EPID 753 - AIDS: Epidemiology and Control (3 Credits)
A study of the epidemiology of Acquired Immunodeficiency Syndrome (AIDS) and its various implications and issues with emphasis on its prevention and control.

EPID 755 - Emerging Infectious Diseases: Epidemiology and Pathobiology (3 Credits)
Principles and factors in emerging infectious diseases with emphasis on epidemiology, pathobiology, prevention, and control.
Prerequisites: EPID 749.

EPID 757 - Epidemiologic Applications to Occupational Health (3 Credits)
Introduction to clinical and epidemiologic aspects of occupational health and recognition and prevention of occupational diseases and injury. Epidemiologic applications to occupational health are highlighted and stressed, including design and implementation.
Prerequisites: EPID 700 or EPID 701.

EPID 763 - Nutritional Epidemiology (3 Credits)
Covers methodology for investigating nutrition's role in health, including nutritional assessment and the design and interpretation of research studies. Substantive issues emphasize major public health concerns of the 21st century.
Prerequisites: EPID 701, PUBH 725, or equivalent.

EPID 765 - Reproductive and Perinatal Epidemiology (3 Credits)
Epidemiology of reproductive and perinatal health with emphasis on current research, controversial issues and methodological approaches.
Prerequisites: EPID 701, PUBH 725, or equivalent course, BIOS 701 .

EPID 767 - GIS and Public Health Applications (3 Credits)
Principles and application of basic and intermediate-level GIS technologies in public health practice and research.

EPID 768 - Psychiatric Epidemiology (3 Credits)
Methodologic issues in the epidemiologic study of psychiatric disorder, the epidemiology of mayor psychiatric outcomes, and issues in the study of special populations.

EPID 770 - Social Epidemiology (3 Credits)
Influence of social factors and the distribution of those factors on patterns of health and disease. Including individual-level examinations of the role of social determinants in producing health, as well as more macro-level examinations of patterns of social disparities in health status.
Prerequisites: EPID 701, PUBH 725, or equivalent course.

EPID 777 - Fundamentals of Genetic Epidemiology (3 Credits)
This course is an introduction to the field of genetic epidemiology, providing students with an understanding of: 1) basic genetics, 2) the tools used by geneticists and genetic epidemiologists, and 3) the integration of genetic data into traditional epidemiologic study designs. This course includes application of epidemiologic and computational software tools used to analyzed genetic data.
Prerequisites: EPID 701 or PUBH 725; BIOS 701.

EPID 788 - Practical Methods for Secondary Data Analysis (3 Credits)
Introduction to data sources and methods commonly used by epidemiologists and health analysts in state or federal health departments and research settings. Methods include data management and analysis using SAS, data interpretation, survey designs, and innovative record linkages.
Prerequisites: PUBH 725 and BIOS 709 or EPID 701 and BIOS 701 and BIOS 709 or BIOS 710, Recommended: BIOS 757, BIOS 758, or BIOS 754; and EPID 741 or equivalent research methods course.

EPID 790 - Independent Study (1-6 Credits)
Directed research on a topic to be developed by M.P.H. or M.S.P.H. student and instructor. May be repeated.

EPID 794 - Selected Topics in Epidemiology (1-6 Credits)
Content varies by title. Course may be repeated for a total of 6 credit hours.

EPID 796 - Integrated Learning Experience (3 Credits)
Demonstrate synthesis of MPH foundational and concentration competencies to address a public health issue in the form of a high-quality written product.
Prerequisites: C or better in PUBH 724, PUBH 725, PUBH 726, PUBH 730, PUBH 735, and EPID 741 or permission of the program director.

EPID 798 - Epidemiology Applied Practicum (3 Credits)
Apply and test public health concepts, theories, and analytical tools learned in the classroom to real-world public health issues outside of the classroom in any one of a variety of settings.
Prerequisites: C or better in PUBH 724, PUBH 725, PUBH 726, and PUBH 730 or permission of MPH Program Director.

EPID 799 - Thesis Preparation (1-9 Credits)

EPID 800 - Advanced Methodological Theory in Epidemiology (3 Credits)
Advanced epidemiologic methods in the design of epidemiologic studies, with emphasis on causal inference. Theories and frameworks of causation and interactions between causes and graphical visualization tools.
Prerequisites: EPID 741.

EPID 801 - Advanced Analytic Methods in Epidemiology (3 Credits)
Extension of research design and development issues with focus on grant writing.
Prerequisites: EPID 800.

EPID 802 - Grant Writing (3 Credits)
Extension of research design and development issues with focus on writing a major research grant application.
Prerequisites: EPID 741.

EPID 805 - Introduction to Systematic Reviews and Meta-Analysis (1-3 Credits)
The major goal for all students taking this course is to provide an overview of how to conduct systematic reviews and meta-analyses from published scientific literature. Emphasis is placed on developing a working knowledge of how to conceptualize a literature review, keyword search for relevant articles through online databases, define inclusion and exclusion criteria, develop coding schemes for study information, and the calculation of effect sizes using published data. For students taking more than 1-credit the additional goals are to provide hands-on experience in conducting a systematic review and meta-analysis, calculating effect sizes, and learning to use meta-analysis software.
Prerequisites: C or better in BIOS 700 and BIOS 701 or their equivalent; C or better in BIOS 757 or equivalent is strongly recommended.

Cross-listed course: EXSC 805

EPID 820 - Seminar in the Epidemiology of Health Effects of Physical Activity (3 Credits)
Seminar presentation and group discussion on the major issues in the study of physical activity and exercise and their impact on health.
Prerequisites: EPID 700.

EPID 830 - Seminar in the Epidemiology of Aging (3 Credits)
Exploration in depth of theories, current health problems, research, and methodological issues in the epidemiology of aging.

EPID 844 - Advanced Cardiovascular Disease Epidemiology: Evidence Synthesis and Evaluation (3 Credits)
Epidemiology of cardiovascular disease and its risk factors, with a focus on evidence synthesis through systematic reviews.
Prerequisites: EPID 701.

EPID 845 - Doctoral Seminar (1-3 Credits)
May be repeated for credit.
Prerequisites: complete at least one semester of course work.

EPID 847 - Advanced Environmental Factors and Human Health (3 Credits)
Advanced methods encompassing the investigation of environmental factors and how they affect human health. Emphasis on reading and interpreting the peer reviewed scientific literature and developing a systematic literature review and grant proposal.
Prerequisites: EPID 700 EPID 701 and BIOS 700 BIOS 701.

EPID 861 - Fundamentals and Applications of Translational Science (3 Credits)
The course is divided into two parts. Part I, the Fundamentals of Translational Science, will provide students with foundational information to understand the basic principles of translational science. Part II of the course, Applications of Translational Science, will provide students with real-world examples of translational science research.

EPID 865 - Methods in Reproductive & Perinatal Epidemiology (3 Credits)
This course provides an overview of reproductive and perinatal epidemiology and the applications in the field of Maternal and Child Health. It covers the current and emerging topics in this area. Designed for doctoral students with interests in conducting research related to reproductive and perinatal epidemiology.
Prerequisites: EPID 700 EPID 701 and BIOS 700 BIOS 701.

EPID 867 - Geographic Information Systems for Public Health Research (3 Credits)
Principles and application of basic and intermediate-level GIS technologies in public health research. Designed for doctoral students with interest in conducting health-related research using GIS methods.

EPID 869 - Clinical Effectiveness (3 Credits)
Clinical Effectiveness is a broad term that includes clinical trials and interventional study designs. The purpose of this course is to develop skills in the application of epidemiologic methods to clinical effectiveness research, by conceptualizing and designing an intervention study. Students will actively participate in teaching and learning through in-class activities and developing a protocol to test an intervention in a clinical trial design.
Prerequisites: EPID 701, PUBH 725, or equivalent course.

EPID 877 - Advanced Methods and Concepts in Nutrition Research (3 Credits)
Advanced Methods and Concepts in Nutrition Research addresses aspects of nutrition ranging from nutritional biochemistry to dietetics and community nutrition education. It covers disciplinary breadth encompassing the study of effects of dietary exposures on inflammation, epigenetics, immune function, psychological states and traits, physiologic states, and pathophysiologic processes, including carcinogenesis.
Prerequisites: EPID 763.

EPID 890 - Independent Study (1-3 Credits)
Directed research on a topic to be developed by doctoral student and instructor. May be repeated.

EPID 894 - Selected Topics in Epidemiology for Doctoral Students (1-3 Credits)
Variable credit doctoral level epidemiology course (1-3). The specific epidemiologic topic to be taught is determined by the course instructor in consultation with the department.

EPID 899 - Dissertation Preparation (1-12 Credits)
Prerequisites: one full year (18 hrs) of graduate study beyond the master's level.

PUBH 678 - Transforming Health Care for the Future (1 Credit)
Foundation for beginning health professions students to gain an understanding of the complexities of the health care system through experiential activities conducted in interprofessional teams and the importance of interprofessional collaboration in order to improve the system.
Cross-listed course: SOWK 678

PUBH 700 - Perspectives in Public Health (3 Credits)
Seminar-format orientation to history, mission, and core services and disciplines of public health to develop understanding of current public health practice and how many health-related disciplines contribute to achieving public health goals.

PUBH 710 - Ethics and the Health Sciences (1-4 Credits)
Students are introduced to formal and informal codes of professional conduct of various health science disciplines and understand the implications of these distinctions for interdisciplinary research, clinical practice, and administration.

PUBH 724 - Quantitative Methods for Public Health Practice I (3 Credits)
Integrated review of quantitative methods to use in public health practice. Includes concepts from epidemiology, biostatistics, and environmental health used to calculate and interpret health indicators for describing the populations' health.

PUBH 725 - Quantitative Methods for Public Health Practice II (3 Credits)
Introduction to epidemiology and biostatistics and their application to public health issues and practice. Covers basic epidemiologic, biostatistical, and data management techniques used to analyze and interpret data in the field of public health.
Prerequisites: C or better in PUBH 724.

PUBH 726 - Qualitative Methods for Public Health Practice (3 Credits)
An introductory course on why, when, and how to apply qualitative data collection and analysis methods to public health activities with a focus on practice-based application. Identifying, working with, and communicating with a range of community stakeholders are also discussed.

PUBH 730 - Public Health Systems, Policy, and Leadership (3 Credits)
A course on public health management and policy process and advocacy to develop effective public health leaders. Included is an emphasis on the relationships between people and their environment and the impact of the environment on human health and well-being.
Prerequisites: PUBH 725 and PUBH 726.

PUBH 735 - Practical Applications of Public Health Planning (4 Credits)
A practical approach to planning public health programs through the application of planning frameworks and the exploration of fundamental issues in planning, implementing and evaluating programs in various settings addressing diverse populations and issues.
Prerequisites: PUBH 725 and PUBH 726.

PUBH 743 - Foundations of Health Disparities (3 Credits)
Evolution of health disparities from historical, public, social, economic, and political perspectives.

PUBH 791 - Special Topics Public Health (1-3 Credits)
Content varies by title.

PUBH 798 - Public Health Practice (1-6 Credits)
Limited work experience or service project in an approved public health setting.
Prerequisites: BIOS 700 or BIOS 701 and EPID 700 or EPID 701.

PUBH 810 - Ethics in Public Health Research and Practice (1 Credit)
Foundations of public health ethics with application to practice and to responsible conduct of research in public health disciplines. Enrollment restricted to Doctoral students & post-docs, master's students by permission of instructor.