

LIFE SCIENCES AND PUBLIC HEALTH DUAL DEGREE

Degree Types: PhD/MPH

The Life Sciences and Public Health Combined PhD/MPH Program (<https://www.feinberg.northwestern.edu/sites/dgp/prospective-students/dual-degree-options.html>) focuses on scientific research and interdisciplinary public health. Graduates of this program will be positioned for leadership roles in academic and government institutions seeking expertise in molecular or cellular approaches to population-based health questions.

Students typically conduct thesis research in the basic mechanisms of infectious diseases or cancer biology. These areas play an increasingly important role in the emerging specialization of molecular epidemiology. Other areas of research, however, are available to dual-degree students.

Applicants wishing to apply to the combined PhD/MPH degree program will do so by selecting L21PH from the application pull-down menu. Applicants should include their intention in their personal statement.

The PhD/MPH program will also accept applications from first-year Driskill Graduate Program in Life Sciences (DGP) students who did not seek admission to the combined degree program before matriculation.

Successful applicants will demonstrate exceptional academic potential, indicative of an ability to master the additional course load required of the combined degree. The DGP and MPH admissions committees make admission decisions jointly.

Additional resources:

- Department website (<https://www.feinberg.northwestern.edu/sites/dgp/>)
- Program handbook(s) (<https://northwestern.box.com/s/gvsjnlhtauf5uw4y9atj27x28or14rn/>)

Degrees Offered

- Life Sciences and Public Health Dual Degree PhD/MPH (<https://catalogs.northwestern.edu/tgs/life-sciences-public-health-dual-degree/life-sciences-public-health-dual-degree-phd-mp/>)

Life Sciences and Public Health Dual Degree Courses

IGP 401-0 Biochemistry I (1 Unit)

Structures and properties of proteins, nucleic acids, and polymers, complex and simple carbohydrates, and lipids; thermodynamic principles applied to biologic systems; molecules; structural correlates and functional expressions.

IGP 403-0 Advanced Immunology (1 Unit)

Topics in immunology. Discussion of current experimental papers.

IGP 405-0 Cell Biology (1 Unit)

Structure and function of cells and their organelles. Morphological, molecular, and physiological approaches to solving cell-biological problems.

IGP 410-0 Molecular Biology (1 Unit)

Topics in molecular biology and the mechanisms of gene and cellular regulation.

Prerequisites: Past or simultaneous enrollment in IGP 401-0 or equivalent.

IGP 420-0 Introduction to Pharmacology (1 Unit)

This lecture-based course begins with an introduction to the basic principles of pharmacology, namely pharmacodynamics (what the drug does to the body) and pharmacokinetics (what the body does to the drug). The subsequent topics apply these basic pharmacological principles to a discussion of the normal physiology, the pathophysiological processes that produce disease, and the targeted pharmacological treatment of disease. This integrated physiological, pharmacological and clinical approach will be applied to the following global topics in sequence: Neuropharmacology (Peripheral and Central Nervous Systems), Antimicrobial and Anticancer Chemotherapy, Cardiovascular and Renal Physiology and Pharmacology, Endocrine and Immunopharmacology.

IGP 422-0 Introduction to Translational Research (1 Unit)

This course is intended to introduce basic life sciences and clinical research graduate students to the thought processes involved in human disease research and its translation into therapy by providing an overview of disease processes, how they are treated, how basic biological science is used to develop those treatments, and the role of various stakeholders in the translational research pipeline. At the end of this course the student should understand the medical rationale for studying basic pathomechanisms and how to utilize that rationale to design studies and grant proposals. In addition, the student will obtain background knowledge for further, disease- or organ-specific upper-level courses.

IGP 425-0 Topics in Drug Discovery (1 Unit)

Key precedents and contemporary topics in drug discovery research in academia and industry. Principles of drug design and action, pharmacogenetics, macromolecular target identification and characterization, bioassays and animal models of disease, study design and information management.

IGP 430-0 Genetics (1 Unit)

Genetics of prokaryotic and eukaryotic organisms; gene regulation and variation; chromosome structure and behavior; linkage and recombination; quantitative and population genetics; biochemical and developmental genetics; and manipulation of genes in organisms, including humans.

IGP 433-0 Advanced Microbial Pathogenesis (1 Unit)

Properties of microorganisms important in the pathogenesis of infectious diseases. Emphasis on molecular aspects of virulence as they relate to host-parasite interactions.

IGP 435-0 Signal transduction and human diseases (1 Unit)

Integrated discussion of different superfamilies of signaling receptors and their effectors. Pathways discussed include G-protein linked, growth factors and cytokines, nuclear receptors and transcription factors.

IGP 436-1 Drugs and the Brain (1 Unit)

Graduate neuropharmacology course with a mix of didactic instruction (33%) and in-depth classroom discussion of primary research papers (66%). The course is not a survey course, but rather will cover selected topics in neuropharmacology with the goals of 1) informing the student of the latest neuropharmacology knowledge, 2) inculcating a rigorous approach to examination of the scientific literature, and 3) encouraging best practices in experimental design.

IGP 440-0 Immunology (1 Unit)

An integrated view of contemporary immunology: antigens, antibodies, humoral and cell-mediated immune responses, cellular interactions, and regulation of immune responses.

IGP 442-0 Microbiology (1 Unit)

Structure and function, taxonomy and replication of infectious agents. Host-parasite interactions and microbial diseases.

Prerequisites: IGP 405-0, IGP 410-0, and IGP 401-0 or equivalent.

IGP 450-0 Tumor Cell Biology (1 Unit)

Basic aspects of the neoplastic phenotype, including morphologic, biochemical, genetic, cytogenetic, and other features; regulation of cell proliferation and differentiation; basic concepts in molecular mechanisms of chemical, viral, and radiation carcinogenesis; solid tumor growth, progression, and metastasis; tumor immunology.

IGP 456-0 Topics in Developmental Biology (1 Unit)

Survey of current models in mammalian and nonmammalian development. Emphasis on stem cell biology. Discussion of experimental papers.

IGP 466-0 Structural Basis of Signal Transduction (1 Unit)

The structural and thermodynamic basis by which protein-protein or protein-nucleic acid interactions mediate signal transduction. Signaling pathways used to explore how the structural biological mechanisms underlying these pathways can be experimentally determined and understood.

IGP 475-0 Virology (1 Unit)

Mechanisms of genome replication, control of gene expression, and protein functions are analyzed in RNA and DNA viruses.

IGP 480-0 Molecular Mechanisms of Carcinogenesis (1 Unit)

Current literature relating experimental approaches and recent discoveries in the fields of cell biology, virology, and molecular genetics to mechanisms of carcinogenesis. Advanced level.

IGP 484-0 Quantitative Biology: Statistics and Data Analysis for Life Scientists (1 Unit)

Parametric statistics (such as the familiar t test); nonparametric and simulation approaches (such as permutation tests) better suited to "real" data; and a conceptual survey of more sophisticated data-mining/machine-learning techniques.

IGP 485-0 Data Science For Biomedical Researchers (1 Unit)

Introduction to the data and analysis tools from several areas of study within the Biomedical Informatics research spectrum. Didactic instruction as an introduction to the topics followed by hands-on demonstrations and exercises to reveal practical use of relevant software tools.

IGP 486-0 Advance Bioinformatics and Genome Informatics (1 Unit)

The course will be oriented towards graduate students in HSIP, DGP and related programs. It will consist of lectures/seminars, each two hours in duration. The course will introduce various high-throughput technologies, such as microarray and Next Generation Sequence data, for measuring and analyzing gene expression, chromosomal deletions and amplifications, methylation patterns and genome architecture. Further, various algorithms and bioinformatics tools for analyzing the produced high-dimensional data will be discussed. The course begins with couple of introductory lectures in the biology part (Experimental/Technology part - 2 hours duration - no laboratory) followed by presentations on algorithms and data analysis (Bioinformatics part - 2 hours duration). Finally some recently published articles using these technologies will be discussed. At the end of the course, the students will be expected to gain an overview of the current highthroughput technologies and use of associated bioinformatics algorithms and analytical methods. Students will gain experience in genomic data visualization tools to analyze multi-omics data for gene expression, genome rearrangement, somatic mutations and copy number variation. The course will conclude

with analyzing and conducting pathway analysis on the resultant cancer gene lists and integration of clinical data.

IGP 493-0 Molecular Basis of Natural History (0 Unit)

The molecular basis of natural history course will examine important examples from Nature and use the approaches of biochemistry, molecular biology and genetics to categorize and analyze the natural products produced by bacteria, plants and animals and examine how they have impacted human history. Most 2 hour sessions will be devoted to a particular topic. After an introduction by faculty, course participants will examine the subject further through the discussion of assigned papers from the literature or other texts. Some sessions will also be devoted solely to presentations of topics by the students. All students will submit and essay on a topic covered by the course or a related topic in natural history.

IGP 494-0 Colloquium on Integrity in Biomedical Research (0 Unit)

Required by National Institutes of Health (NIH) but does not count as one of the required IGP courses.

IGP 495-0 Science and Society (0 Unit)

Exploration of the foundations of modern science and discussion of how these ideas impact social issues in the biomedical sciences (creationism, abortion, euthanasia, eugenics, cryogenics, replacement therapies, animal rights).

IGP 496-1 Introduction to Life Science Research (0 Unit)

Provides first-year IGP students with tools to develop the knowledge base and skill set necessary for competent research.

IGP 496-2 Introduction to Life Science Research (0 Unit)

Provides first-year IGP students with tools to develop the knowledge base and skill set necessary for competent research.

IGP 496-3 Introduction to Life Science Research (1 Unit)

Provides first-year IGP students with tools to develop the knowledge base and skill set necessary for competent research.

IGP 499-0 Independent Study (1-3 Units)

SEE DEPT FOR SECTION AND PERMISSION NUMBERS.

IGP 590-0 Research (1-3 Units)

Independent investigation of selected problems pertaining to thesis or dissertation.

PUB_HLTH 301-0 Behavior, Society & Health (1 Unit)

The course analyzes the interplay of social structure, technology, culture and demography on patterns of health, illness and health behavior. The course focuses on the application of theories of behavioral change for solving health and public health problems, including stages of change, relapse prevention, social advertising and social marketing methods for use in primary care and community settings.

PUB_HLTH 302-0 Introduction to Biostatistics (1 Unit)

The course focuses on descriptive statistics, principles of exploratory data analysis, basic probability, hypothesis testing, correlation, simple linear regression, and the basics of the analysis of variance. All examples are directed towards application of these methods in the medical and health fields.

PUB_HLTH 303-0 Environmental Health Sciences (1 Unit)

The course offers a broad background introduction to the analysis of the health consequences of exposure to air, weather, food, the workplace and other special environments potentially contaminated by biologic, chemical and physical agents.

PUB_HLTH 304-0 Introduction to Epidemiology (1 Unit)

This course introduces the science of epidemiology and its uses, including measures of disease occurrence, common sources and types

of data, important study designs and sources of error in epidemiologic studies.

PUB_HLTH 305-0 Programming for Statistical Analysis (1 Unit)

This is an introductory course to programming for statistical analysis using SAS. Topics include data management, descriptive statistics, tests of association and reports.

PUB_HLTH 310-0 Foundations of Public Health I (0 Unit)

This three-quarter sequence is required for all MPH students during the first year of enrollment. Students earn one unit of credit, awarded in the spring quarter. The "Foundations" course focuses on knowledge acquisition and skill development essential for public health practice. Foundations uses the case-based teaching method, and covers the Council on Education for Public Health (CEPH)'s 12 required knowledge objectives for MPH education.

PUB_HLTH 311-0 Foundations of Public Health II (0 Unit)

This three-quarter sequence is required for all MPH students during the first year of enrollment. Students earn one unit of credit, awarded in the spring quarter. The "Foundations" course focuses on knowledge acquisition and skill development essential for public health practice. Foundations uses the case-based teaching method, and covers the Council on Education for Public Health (CEPH)'s 12 required knowledge objectives for MPH education.

PUB_HLTH 312-0 Foundations of Public Health III (1 Unit)

This three-quarter sequence is required for all MPH students during the first year of enrollment. Students earn one unit of credit, awarded in the spring quarter. The "Foundations" course focuses on knowledge acquisition and skill development essential for public health practice. Foundations uses the case-based teaching method, and covers the Council on Education for Public Health (CEPH)'s 12 required knowledge objectives for MPH education.

PUB_HLTH 313-0 Topics in Public Health (0.5 Unit)

This variable topics course addresses important current issues in public health.

PUB_HLTH 314-0 Topics in Public Health (0.5 Unit)

This variable topics course addresses important current issues in public health.

PUB_HLTH 316-0 Topics in Public Health (1 Unit)

This variable topics course addresses important current issues in public health.

PUB_HLTH 317-0 Seminar in Community Health Research (0 Unit)

The Seminar in Community Health Research is a weekly one-hour seminar that is required for all MPH students in the Community Health Research concentration. The student will earn one unit of credit for each year, awarded in the fall quarter. The seminar will provide students with an overview of methods, approaches and research design considerations that are relevant to design, implementation and evaluation of community health research. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight community health research conducted by Northwestern faculty as well as research conducted at other universities.

PUB_HLTH 318-0 Seminar in Community Health Research II (0 Unit)

The Seminar in Community Health Research is a weekly one-hour seminar that is required for all MPH students in the Community Health Research concentration. The student will earn one unit of credit for each year, awarded in the fall quarter. The seminar will provide students with an overview of methods, approaches and research design considerations

that are relevant to design, implementation and evaluation of community health research. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight community health research conducted by Northwestern faculty as well as research conducted at other universities.

PUB_HLTH 319-0 Seminar in Community Health Research III (1 Unit)

The Seminar in Community Health Research is a weekly one-hour seminar that is required for all MPH students in the Community Health Research concentration. The student will earn one unit of credit for each year, awarded in the fall quarter. The seminar will provide students with an overview of methods, approaches and research design considerations that are relevant to design, implementation and evaluation of community health research. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight community health research conducted by Northwestern faculty as well as research conducted at other universities.

PUB_HLTH 320-0 Community Engaged Research (1 Unit)

This introductory course in community health considers the basic elements that determine health and asks difficult questions about why the richest and most powerful country in world history is so unhealthy? Discussion will focus on differences in communities, community health assessments, principles for effective collaboration with communities and introduction to community health research.

PUB_HLTH 323-0 Health Equity (1 Unit)

This course provides an overview of social, economic and political inequities in the United States and their impact on the health of the poor, uninsured, elderly, racial and ethnic minorities, migrants, gendered and sexual groups, rural residents, people with mental and physical disabilities and other vulnerable and socially disadvantaged populations. Past and current policies and trends in health /medical care programs and services at the local and national levels will be discussed. Students will examine social science concepts and theoretical frameworks that will expand their knowledge and skills and empower them to become agents of social change using public health models to impact individuals, families, communities and institutions. Class topics and discussions will center on: social and income inequalities; access (or lack of) to healthcare, including preventive services and other social resources; roles of government and the legislative process; quality care; legal and ethical issues; among others. Throughout the course, discussions will center on the social determinants of health - neighborhood environments and strategies toward short and long term solutions in the elimination of health disparities and achieving health equity. Discussion about the Patient Protection and Affordable Care Act and recent Supreme Court rulings will also be integrated into many of the discussions.

PUB_HLTH 330-0 Global Tobacco: Control and Prevention (1 Unit)

The purpose of the course is to provide students with information on the health problems associated with tobacco use across the lifespan; the consequences of second- and third-hand smoke; new and promising clinical, public health and legal strategies for both prevention and cessation; and international perspectives on tobacco control. Special emphasis will be directed at tobacco use and prevention among vulnerable populations, including youth, minorities and the poor.

PUB_HLTH 350-0 Dual Degree Seminar: Topics in Public Health for the Physical Therapist (0.05-0.15 Unit)

The Topics in Public Health for the Physical Therapist seminar course sequence prepares the physical therapist/public health professional

by explicitly linking and integrating physical therapy practice and public health practice. The course emphasis is to foster awareness of opportunities for the physical therapist/public health professional through discussion and analysis of public health practice and physical therapy practice. This course provides students the opportunity to interact with faculty on topics that integrate physical therapy and public health practice and policy. Goals of this course are to discuss the intersection of population health and clinical practice and the application of core skills needed for success in a physical therapist-public health career. Prerequisite: Only students in the DPT-MPH degree program are eligible to take this course.

PUB_HLTH 387-0 Seminar in Global Health I (0 Unit)

The Seminar in Global Health is a weekly one-hour three-quarter (Fall, Winter, Spring) seminar that is required for all MPH students in the Global Health concentration. The seminar will provide students with an overview of the concentration, the interdisciplinary breadth of coursework, and the field and culminating experiences. The seminar will provide opportunities for critical analysis and dialogue on major global health issues. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program and Global Health Concentration. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight global health research and practice. All three courses (PUB_HLTH 387-0, PUB_HLTH 388-0, PUB_HLTH 389-0) must be successfully completed in order to earn 1 credit at the end of spring quarter.

PUB_HLTH 388-0 Seminar in Global Health II (0 Unit)

The Seminar in Global Health is a weekly one-hour three-quarter (Fall, Winter, Spring) seminar that is required for all MPH students in the Global Health concentration. The seminar will provide students with an overview of the concentration, the interdisciplinary breadth of coursework, and the field and culminating experiences. The seminar will provide opportunities for critical analysis and dialogue on major global health issues. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program and Global Health Concentration. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight global health research and practice. All three courses (PUB_HLTH 387-0, PUB_HLTH 388-0, PUB_HLTH 389-0) must be successfully completed in order to earn 1 credit at the end of Spring quarter.

PUB_HLTH 389-0 Seminar in Global Health III (1 Unit)

The Seminar in Global Health is a weekly one-hour three-quarter (Fall, Winter, Spring) seminar that is required for all MPH students in the Global Health concentration. The seminar will provide students with an overview of the concentration, the interdisciplinary breadth of coursework, and the field and culminating experiences. The seminar will provide opportunities for critical analysis and dialogue on major global health issues. Many of the topics covered in this course will be discussed in greater detail in other core and elective courses within the MPH program and Global Health Concentration. An emphasis will be placed on providing case examples to help illustrate key points. These case examples will highlight global health research and practice. All three courses (PUB_HLTH 387-0, PUB_HLTH 388-0, PUB_HLTH 389-0) must be successfully completed in order to earn 1 credit at the end of Spring quarter.

PUB_HLTH 390-0 International Public Health I (1 Unit)

Introduction to International Public Health will orient students to the biological, socio-cultural and economic influences on population-level variation in health and well-being. The continuum between health and illness will be explored, focusing on both the proximate and distal determinants of variation in health and well-being. Students will learn about key players in international health - the multilateral and bilateral

donor communities, Ministries of Health, UN agencies, foundations, NGOs - and understand important shifts in donor policies towards healthcare delivery. They will be introduced to the major health problems currently affecting the developing world and alerted to the importance of employing a population-based vs. a purely clinical approach to solving these health problems.

PUB_HLTH 391-0 Global Health Care Service Delivery (1 Unit)

The course will engage students in an analysis of case studies that describe interventions to improve healthcare delivery in resource-limited settings. The cases capture various programmatic, organizational and policy-related innovations related to care delivery. Classroom discussions of these case studies will help illuminate principles and frameworks for the design of effective global health interventions. Through a focus on HIV, TB, malaria and other health conditions, these cases will allow students to carefully consider the question of how epidemiology, pathophysiology, culture, economy and politics inform the design and performance of global health programs.

PUB_HLTH 393-0 Introduction to Health and Human Rights (1 Unit)

This course, which is open to Public Health, Law and Kellogg students, examines the intersection of health and human rights at the global and national levels, in theory and in practice. Readings and discussion will focus on the following topics: the complex relationship between health and human rights; the right to health; global activism and litigation to promote health and human rights; the movement for access to medicines; sexual and reproductive health rights; and health systems in the United States. Students will work in interdisciplinary teams on a health assessment and intervention known as the Northwestern Access to Health Project. Headed by Professor Brian Citro, with assistance from Health and Human Rights Fellow Elise R. Meyer, the Access to Health Project seeks to leverage academic and community partnerships to maximize access to health in communities in the developing world and the United States.

PUB_HLTH 411-0 Assessment, Planning & Evaluation in Community Health (1 Unit)

Assessment, Planning and Evaluation are three core features of community health research. The objective of this course is to provide an overview of the fundamental and basic skills needed for conducting research with community partners related to health assessments, program planning and evaluation of public health programs. We will focus on efforts needed in working with community partners and research methodologies recommended for effectively and efficiently conducting research without interrupting the flow of community organizations. You will have an opportunity to talk with representatives from community organizations and to apply your learning to an actual community setting.

PUB_HLTH 412-0 Infection Disease Epidemiology and Prevention (1 Unit)

This course focuses on the public health tools for the surveillance, identification, control and prevention of selected infectious diseases of public health importance. Special emphasis will be focused on outbreak investigations because they provide a unique opportunity to apply many principles of public health practice, including use and interpretation of surveillance data, risk factor analysis and implementation and assessment of control measures.

PUB_HLTH 414-0 Injury and Violence Prevention (1 Unit)

This course examines injury as a public health problem and explores research methods, study design, risk factors and prevention strategies applied to problem of injuries. This general framework will be applied to the study of specific injury mechanisms.

PUB_HLTH 415-0 Disease Prevention and Health Promotion: Principles and Application (1 Unit)

This course explores the value of and barriers to disease prevention and health promotion (DP/HP), factors that influence personal health decisions, preventive interventions directed at individuals (clinical settings) and populations (community settings), strategies for using population health principles to integrate DP/HP into routine medical and Public Health practice and the organization of federal agencies that fund DP/HP activities.

PUB_HLTH 416-0 Program Evaluation (1 Unit)

This course will provide students with a comprehensive theoretical, methodological and ethical foundation for conducting public health program evaluation. Students will experience the practice aspects of evaluation including communicating and negotiating with stakeholders, conducting an evaluability assessment, developing logic models and evaluation questions, identifying appropriate data collection methods, gathering reliable and valid evaluation data that are appropriate to the selected design and analysis methods, analyzing data, reporting evaluation results, and ensuring evaluation use. The instructor will facilitate a learning and skill-building environment, drawing on personal experiences and the expertise of others in the field.

PUB_HLTH 417-0 Public Health Law: Promoting Healthy Youth Development (1 Unit)

This course examines the application of law to critical Public Health issues affecting children and youth including the constitutional and statutory foundation of Public Health law, how legislative and regulatory decisions must negotiate the balance between individual rights and public good and the principles of *parens patriae* and state police powers. Case studies will illustrate the basis of Public Health jurisprudence at the national level.

PUB_HLTH 418-0 Applied Practice Experience I (0 Unit)

The Applied Practice Experience (APEX) is a two course sequence, PUB_HLTH 418-0 and PUB_HLTH 419-0. Students complete this course while working at a public health service organization or faculty-supervised public health project. Students examine real-world aspects of public health practice through scholarly literature, community-based experiential learning, peer coaching, and skill-building modules.

PUB_HLTH 419-0 Applied Practice Experience II (0 Unit)

In the APEX II, students gain real-world public health practice experience by working with public health leaders to develop public health products that serve diverse communities in domestic or international settings. All MPH students are required to complete the practice experience. Prerequisite: PUB_HLTH 418-0.

PUB_HLTH 420-0 Introduction to US Health Care System (1 Unit)

Course Aims: Be able to state and explain the structure, key facts and important issues pertaining to the U.S. health system. Be able to research topics for further study by becoming familiar with the relevant literature and be able to analyze problems in this sector by understanding applicable frameworks.

PUB_HLTH 421-0 Intermediate Biostatistics (1 Unit)

Intermediate Biostatistics builds upon the material learned in Introduction to Biostatistics. Specifically, the course will focus on single-outcome, multiple-predictor methods: multiple linear regression for continuous outcomes, logistic regression for binary outcomes, and the Cox proportional hazards model for time-to-event outcomes. Degree-seeking students must take either this course or PUB_HLTH 422-0.

PUB_HLTH 422-0 Intermediate Epidemiology (1 Unit)

This course covers epidemiologic methods used in observational epidemiologic studies including the design, conduct and interpretation of observational studies in human populations with a focus on analytic cross-sectional, case-control studies and cohort studies. Key issues

related to statistical approaches, validity of measures of exposure and disease and sources of potential errors in interpreting epidemiologic studies will be addressed.

Prerequisites: PUB_HLTH 304-0, PUB_HLTH 302-0. Recommended: PUB_HLTH 421-0.

PUB_HLTH 425-0 Introduction to GIS and Spatial Analysis for Public Health (1 Unit)

This course is an introduction to GIS and the collection, maintenance and analysis of spatial data for health. It combines practical ArcGIS skills with study of the theory and applications of spatial data and spatial analysis in general and specifically as it relates to population health.

PUB_HLTH 430-0 Global Health Research Practicum (1 Unit)

Students will learn to design an evidence-based and culturally appropriate global health research project or program. Specifically, students will gain competence in analyzing needs and resources; developing a technically and programmatically sound causal pathway; articulating program objectives; designing relevant program components and partnerships, implementing a program, planning program monitoring and evaluation, and ensuring program sustainability.

PUB_HLTH 431-0 Basic Decision Analysis and Models of Medical Decision Making (1 Unit)

This course covers quantitative analytic techniques intended to inform decision makers at the bedside, researchers, and those involved with policy-making. Topics include probability, Bayes' theorem, sensitivity and specificity of diagnostic tests, and decision psychology, with a focus on decision analysis, utility assessment, and cost-effectiveness analysis.

PUB_HLTH 435-0 Health Services Research Design & Analysis Strategies: Technology Assessment (1 Unit)

This course is an independent study research seminar based on individual student meetings with the instructor and other faculty mentors. The course focuses on completion of a health services research or health policy paper and oral presentation, often in conjunction with MPH program Culminating Experience requirements. Papers require health services research methodological and study design skills or the conceptual and analytical skills needed for public health history or health policy analyses. Learning objectives include applying health services research methods to a public health, clinical policy or public policy problem or debate, describing factors underlying geographic or provider variations in medical practice or health outcomes, using quality measurement, quality improvement, patient safety or epidemiologic research techniques, conducting risk adjustment for evaluation of medical or behavioral health interventions, and addressing critical issues in social determinants of health or social epidemiology. Enrollment requires prior consent of the instructor.

PUB_HLTH 437-0 Practicum on Epidemiologic Research Design & Data (1 Unit)

This course provides hands-on experience in the design and analysis of epidemiologic studies, with emphasis on applying methodology learned in intermediate level courses. Through independent projects and class exercises, the course covers practical aspects of conducting research. Public Health students are encouraged to bring ideas for their culminating experience to the course so that they can further develop and refine their research plan.

PUB_HLTH 438-0 Survey Design & Methodology (1 Unit)

This course focuses on methodological issues regarding the design, implementation, analysis and interpretation of surveys and questionnaires in Public Health research. Various types of self-report data will be discussed, including knowledge, attitudes, behaviors and patient-reported outcomes. Issues will include formatting and layout, wording of items and response scales, multilingual translations, sampling, timing of

assessments, interviewer training, participant recruitment, data analysis and respondent and staff burden.

PUB_HLTH 439-0 Qualitative Research Methods (1 Unit)

This course focuses on qualitative research design, sampling, data management, analysis and report writing. Methods covered include cognitive interviewing for survey construction, individual and group interview methodologies, participant observation, writing and using field notes, cognitive tasks such as decision modeling, domain analysis and the use of mapping techniques in qualitative research. Data analysis instruction includes thematic analyses and code development, consensus and network analyses and an overview of qualitative data management programs.

PUB_HLTH 441-0 Ethical Issues in Clinical Research (0.5 Unit)

This case-based course provides student with knowledge of the issues surrounding the ethical conduct of research including making ethical choices in the face of conflicts, and gaining a familiarity with the regulations governing human subjects research.

PUB_HLTH 444-0 Advanced Decision Analysis (1 Unit)

This course covers advanced decision-analytic methods useful in medical decision modeling. Included are the probabilistic theory of hazard rates and modeling of age-dependent mortality, Markov modeling, stochastic tree modeling, techniques for multi-way sensitivity analysis such as probabilistic sensitivity analysis and information-value analysis and software of stochastic tree modeling. Medical decision-analytic literature is reviewed and theoretical underpinnings of models are explored. A project using decision analysis software is required.

PUB_HLTH 445-0 Writing and Peer Reviewing for Scientific Publication (1 Unit)

Writing and Peer Reviewing is an intensive, hands-on, advanced course in writing for publication in biomedical journals and how to be a successful peer reviewer. The student will be expected to prepare an article, respond to two peer review cycles and at the conclusion of the course, to be ready to submit to a journal.

PUB_HLTH 446-0 Design, Conduct & Analysis of Clinical Trials (1 Unit)

This course introduces commonly used designs for clinical trials, methods for randomization, blinding and sample size determination, choice of controls, collaborative/multicenter trial requirements and operational issues, data management and data quality issues, interim analysis methods, critical review of clinical trial results and statistical techniques for analyzing data.

PUB_HLTH 448-0 Introduction to Maternal Child Health (1 Unit)

This course provides an introduction to the health needs of women and children and the services designed to meet these needs. It introduces the epidemiology of maternal and child health (MCH) and the evidence base for MCH programs. The course provides students with a comprehensive knowledge base with respect to federal funding and other public programs addressing MCH.

PUB_HLTH 449-0 Public Health Policy (1 Unit)

This course addresses how public policy development and analysis have an impact on the public's health. The course is designed to provide professionals with the skills for collecting, analyzing and communicating information on public health policy issues using approaches that would be useful in the policymaking arena. Students will learn what policy is; who the policymakers are in public health; who the actors are that are affected by Public Health policy; and the major influences in determining what policy gets implemented, including the science underlying policy proposals.

PUB_HLTH 490-0 Advanced Global Public Health (1 Unit)

Advanced Global Public Health will provide an in depth exploration of the current approaches to eradicating long-term social and economic inequalities in health outcomes around the world. We will begin with a review of the current state of global health, highlighting the areas of major gains since 2000, discourse on global health governance, and current trends and emerging health challenges (e.g., chronic metabolic diseases, emerging/re-emerging infectious diseases, humanitarian emergencies). We will then directly examine the diverse strategies that have been used to improve health outcomes in low- and middle-income countries. These strategies range from biomedical interventions (e.g., vaccine campaigns, nutritional supplementation) to broader, macro-level approaches such as targeted cash transfers and agricultural reform. Drawing on detailed case studies, we will explore (a) the nature and structure of global health interventions, (b) the creation of successful partnerships for sustaining health outcomes, and (c) the importance of data collection and analysis for monitoring the effectiveness of program interventions.

Prerequisite: PUB_HLTH 390-0 or GBL_HLTH 301-0.

PUB_HLTH 499-0 Independent Study (0.5-1 Unit)

PUB_HLTH 500-0 Public Health Experience in Physical Therapy (0 Unit)

Public Health Experience in Physical Therapy.

PUB_HLTH 520-0 Artificial Epidemics and Changes in Human Culture (0.5 Unit)

This course provides a close examination of how human behavior affects the development and spread of so-called "artificial epidemics," primarily covering non-communicable diseases affecting adults. Diseases and conditions will be examined in order to discern the epidemiology of the disease and how cultural influences can impact both the rise of diseases as public health issues and their subsequent decline in incidence with a view toward prevention of future outbreaks. The course is designed as a "flipped classroom"; students will review materials in advance of the class session and come prepared to share and discuss the week's topic in class. Thus there is an exceptional long reading list each week and only 1 hour of classroom, rather than 90 minutes, per week in this ½ unit class.

PUB_HLTH 521-0 Artificial Epidemics and Changes in Human Culture II (0.5 Unit)

This course provides a close examination of how human behavior affects the development and spread of so-called "artificial epidemics," primarily covering non-communicable diseases affecting women and children. Diseases and conditions will be examined in order to discern the epidemiology of the disease and how cultural influences can impact both the rise of diseases as public health issues and their subsequent decline in incidence with a view toward prevention of future outbreaks.

The course is designed as a "flipped classroom"; students will review materials in advance of the class session and come prepared to share and discuss the week's topic in class. Thus there is an exceptional long reading list each week and only 1 hour of classroom, rather than 90 minutes, per week in this ½ unit class.

PUB_HLTH 524-0 Cardiovascular Disease Epidemiology (1 Unit)

The course will cover selected topics in cardiovascular disease with critical analysis of the current epidemiologic literature. Students will have the opportunity to study methodological issues, contemporary findings and recommendations for future research.

PUB_HLTH 525-0 Cancer Epidemiology (1 Unit)

This course introduces concepts of cancer biology and molecular mechanisms of carcinogenesis, elaborates concepts in epidemiology to studies of cancer epidemiology, uses project-based learning to build skills needed to assess patterns of tissue-specific cancer epidemiology

including risk factors and trends, and covers methods of assessing the validity of current literature and media coverage of cancer epidemiology.

PUB_HLTH 560-0 Culminating Experience (1 Unit)

Development and presentation of a culminating research or service project based on one month (or at least 200 contact hours) of fieldwork in a community agency or work on a research project of the student's choosing (with guidance from a faculty member) in consultation with an adviser or advisory committee. Student presents a seminar and submits a paper on the project.