ENVIRONMENTAL HEALTH SCIENCE (EHSC-GA)

EHSC-GA 1004 Environmental Health (4 Credits)
Typically offered occasionally
Introduction to basic concepts of environmental health, including pollutant sources, their fate, and impacts in the environment (air, water, food, and soil) and occupational settings. Human hazard recognition and evaluation are presented in terms of toxicology, epidemiology, exposure assessment, and risk assessment, including discussion of ongoing environmental controversies.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 1005 Ecotoxicology: Hudson River Case Study (4 Credits)
Typically offered Fall
Ecosystems throughout the country are polluted with a variety of toxic chemicals. This course uses the Hudson River as a model to investigate the sources, transport, transformation, toxic effects, management strategies, and remediation of polluted ecosystems. Over 200 miles of the Hudson River estuary has been designated a U.S. federal Superfund site because of contamination from PCBs, dioxins, and metals. As baseline information, this highly interdisciplinary course initially investigates the geological history of the Hudson River, its hydrology, and inventory of species composition. Those chemical, physical, and biological factors impacting the bioavailability of contaminants to the ecosystem are presented. Efforts to model the trophic transfer of PCBs through the food chain are discussed. Toxic effects (cancer, reproductive disorders, immunological changes, etc.) of these contaminants to Hudson River fish, bird, and mammalian populations are highlighted. Models of resistance of populations to chemical contaminants are explored. Accumulation of toxicants and possible effects on human consumers of Hudson River resources are introduced. Potential beneficial effects of microbial bioremediation strategies are introduced. Problems and issues in the management of Hudson River Superfund sites are discussed by regulatory officials as are the strategies of advocacy groups to remediate these sites. Impacts of remediation of one site on its natural populations are presented.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 1006 Toxicology (4 Credits)
Typically offered occasionally
Introduction to the science of toxicology, stressing basic concepts essential to understanding the action of exogenous chemical agents on biological systems. Principles underlying the absorption, metabolism, and elimination of chemicals are discussed. Toxicokinetics, specific classes of toxic responses, and experimental methods used to assess toxicity are also examined.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 1009 Biomarker Environmental Exposures and Human Health (4 Credits)
Typically offered Spring term of even numbered years
Application of biomarkers in human populations is a useful approach that incorporates advanced laboratory technology with epidemiology to evaluate the health hazards and risk of exposure to environmental pollutants at low levels. It is increasingly utilized as a tool to understand the interactions between genes and environmental exposures and to identify ?at-risk? populations and individuals. This course covers both the basic concepts and the practical issues involved in conducting biomarker studies in human populations with environmental exposures. Topics include the strengths and limitations of biomarker applications, criteria for the selection and validation of commonly used biomarkers, approaches of newly emerging technologies (e.g., proteomics) relevant to discovery and development of new biomarkers, issues of quality control, and ethical considerations in biomarker research. The course also provides students with lectures focusing on specific environmental carcinogens regarding the current findings and future research needs of their biomarker applications.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 1010 Global Climate Change, Air Pollution, and Health (4 Credits)
Typically offered Fall
Global climate change concerns have made clear the need to better understand the interaction of air pollution and weather. This course gives the student an appreciation for the scientific bases for the known effects of weather on air pollution and, conversely, for the known and hypothesized effects of air pollution on weather and climate change, as well as their respective interactions with human health. Lecture topics include the fundamentals of atmospheric motions and weather; air pollution formation and dispersion in the atmosphere; acidic air pollution and acid rain; the health effects of air pollution and of extreme weather; global-scale weather and air pollution; and the effects of air pollution on the ozone layer and climate change.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2018 DNA Replication, Damage & Repair (4 Credits)
Typically offered occasionally
The basic processes involved in DNA replication, damage formation, and processing, with an emphasis on eukaryotic cells. Topics include DNA structure and the chemistry of adduct formation, DNA polymerase structure and function, DNA replication mechanisms and fidelity, the enzymology of DNA repair, and mechanisms of mutagenesis.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2025 Communication skills for Biomedical Students (2 Credits)
Typically offered occasionally
Basic principles of effective scientific communication are presented in this course. Lectures and hands-on practice sessions cover (1) poster presentations for scientific meetings, (2) brief verbal presentations, and (3) writing papers for publication in a scientific journal. Students are encouraged to use their own data for the various communication formats. Students are expected to attend and to critique seminars given at Sterling Forest by outside speakers that are sponsored by the Department of Environmental Medicine; these seminars are given on the same day as the class.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2026 Research Methods in Molecular Toxicology (2 Credits)
Typically offered Spring
Introduce graduate students to the molecular biology research strategies and techniques that are widely used in toxicology: cell culture, analyzing cell growth properties, analysis of DNA, RNA and proteins, gene function analysis, in vitro and in vivo assessment of toxicity and analysis of cell response to oxidative stress.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2031 Tutorials in Env Hlth Sc (1-4 Credits)
Typically offered Fall and Spring
Tutorials arranged on an individual basis with a faculty member for the advanced study of special subjects in the environmental health sciences. A short brief, written description of the topics being covered must be approved in advance of registering for this tutorial. A comprehensive paper or examination is required.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2033 Aerosol Science of Particulate Air Pollution (4 Credits)
Typically offered occasionally
Comprehensive introduction to the properties, behavior, and measurement of suspended particles, including background on their underlying physical and chemical characteristics. Presents the properties of ambient atmospheric aerosols and their respiratory deposition.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2035 Principles of Environmental Measurements (4 Credits)
Typically offered Fall
Instrumentation, procedures, and strategies for quantitative evaluation and control of hazardous exposures. Emphasis is on airborne contaminants, including particles, gases, and bioaerosols, plus physical agents, including ionizing and nonionizing radiations, noise, and abnormal temperatures. Decision-making criteria are considered for each agent, as is the performance of environmental control methods, including ventilation and local exhaust systems.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2037 Environmental Measurements Laboratory I (4 Credits)
Typically offered Fall
Covers the instrumental techniques and procedures for the subjects covered in G48.2035.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2038 Industrial Hygiene and Occupational Health (4 Credits)
Typically offered occasionally
This course introduces students to the general principles of industrial hygiene and occupational health. The purpose of this course is to provide basic theoretical knowledge as well as practical experience in industrial exposure and hygiene, occupational health and safety. Recognition, evaluation and control of human exposure to noise, heat, bio-hazards, chemicals, radiation and improper lighting are discussed. Government standards, field measurements, work practices, engineering designs and the effects of excessive exposure on worker health and productivity are addressed. Students will also be provided with industrial hygiene and occupational health laboratory experience. The goal of practical aspect is to familiarize students with various chemical and biological hazards and their practices to answer specific industrial hygiene and occupational health research questions. Brief reviews of sampling and relevant analytical approaches, their applications in industrial hygiene and occupational safey will be covered step by step in this course. Students will also be required to read for weekly classes and to complete homework assignments in industrial hygiene and occupational health.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2039 Introduction to Epidemiology (4 Credits)
Typically offered Fall
Epidemiology, one of the key sciences of public health, is the study of the distribution and determinants of disease in humans. In this course, principles and methods of epidemiology are developed for students intending to conduct independent research on health-related issues. Topics include measures of disease occurrence and risk, designs for observational and interventional studies, sensitivity and specificity of clinical tests, methods for epidemiologic analyses, and ethical issues regarding conduct of epidemiologic studies. Class time is divided among lectures, discussions evaluating classical and current studies that have used epidemiologic methods, and development of projects that form the basis of term papers. Grades are based on class presentations, term papers, pop quizzes, and midterm and final examinations.
Grading: GSAS Graded
Repeatable for additional credit: Yes

EHSC-GA 2040 Molecular and Genetic Toxicology (4 Credits)
Typically offered occasionally
Analyzes the modes by which organisms handle damage to DNA by physical and chemical agents, the mechanisms of converting damage to mutations, and the theoretical basis for carcinogenesis screening methods utilizing mutagenesis. Topics include systems for mutagenesis testing, mutational spectra, and inducible responses to DNA damage.
Grading: GSAS Graded
Repeatable for additional credit: Yes

EHSC-GA 2042 Genetic Susceptibility & Toxicogenomics (4 Credits)
Typically offered Spring term of even numbered years
Genetic variation at many loci has been described in human and wildlife populations. Recent studies have explored the relationships between this variation and susceptibility to diseases. This course examines the extent of genetic variation in genomes, the techniques by which sensitive genes and allelic variants are identified, and the consequences of genetic variation on phenotypic expression. Emphasis is on the relationship between genetic variation and susceptibility to environmentally induced diseases, such as cancers, through effects on toxicant metabolism, DNA repair, and signal transduction genes. The role of genetic adaptations to resistance of natural populations of wildlife is also presented. In addition, emphasis is on epidemiological techniques used to explore relationships between polymorphisms and disease and the moral and legal ramifications of access to this data.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2043 Cell Signaling & Environmental Stress (4 Credits)
Typically offered Spring term of odd numbered years
In the last few years, we have gained extensive knowledge of how cell surface receptors transmit signals to the nucleus, thereby controlling the expression of genetic programs involved in many cellular processes, including normal and aberrant cell growth. Signaling motifs (e.g., nuclear transcription receptors, kinase/phosphatase cascades, G-coupled protein receptors, etc.) are components of signaling webs, which are targets of disruption by environmental pollutants. This course covers various signal transduction pathways such as cytokine signaling and signal transduction to the nucleus by mitogen-activated protein kinase (MAPK). Some of the known detailed mechanisms, such as regulation of MAPK by phosphatases (removal of phosphorylation) and dual phosphorylation of MAPK on the relevant threonine and tyrosine leading to the downstream activator protein-1 (AP-1) activation, are discussed. The course further illustrates that alteration of the pathways by environmental pollutants, such as transition metals and airborne particles, may be implicated in pathological processes, cancer, inflammation, and chronic obstructive pulmonary diseases. Students gain a basic understanding of principles emerging in the signaling field and how they serve as guiding tools for students engaged in basic, clinical, and translational medical research.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2044 Epidemiologic Methods (3 Credits)
Typically offered Spring
Principles introduced in G48.2039 are further developed. Methods to design, analyze, and interpret epidemiologic studies concerned with disease etiology are presented. The main focus is on cohort and case-control studies. Topics include bias, confounding, measurement error, and sample size determination.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2046 Epidemiology of Cancer (4 Credits)
Typically offered occasionally
The epidemiology of cancer in its biological context and illustration of how it could be used in the search for cancer etiology and control. Role of viruses, radiation, nutrition, hormones, tobacco, occupational exposures, and genetic factors in the causation of cancer. Strategies for exposure and risk assessment and for cancer control, including screening. Issues of study design and statistical analysis in cancer epidemiology.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2047 Intro to Survival Analysis (4 Credits)
Typically offered occasionally
This course reviews the basic concept of survival analysis, including hazard functions, survival functions, types of censoring, Kaplan-Meier estimates, and log-rank tests. Parametric inference includes the Exponential and Weibull distribution. The proportional hazard model and its extension to time-dependent covariates are included. Additional topics include accelerated failure time model, competing risks and multistate models. Recurrent event data are also clinical and epidemiological examples used to illustrate the various statistical procedures.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2049 Epidemiologic Methods II (3 Credits)
Typically offered occasionally
You've probably heard the phrase "correlation doesn't equal causation". But if we care about improving population health and health equity, we ultimately need to know what is causing the distributions of disease, disability, and death that we observe in places and over time. A more helpful phrase that will guide this course is: "correlation equals causation under certain assumptions." This course aims to build upon your existing knowledge of epidemiology by introducing you to a formal, counterfactual approach to causal inference. The goal of this course is for you to understand how theoretical assumptions, formulation of research questions, study design, and statistical analysis determine one's ability to interpret an association as a causal effect, and what the implications of the causal effects are for public health. Themes of this course are relevant across a range of disciplines, including population health, social and environmental epidemiology, and public health policy.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2050 Epigenetics & Environmental Diseases (4 Credits)
Typically offered Spring
Covers environmental effects on gene expression via epigenetic mechanisms; DNA methylation, histone modifications and micro RNA. Provides basic understanding of epigenetic modifications; methods of epigenome analysis; candidate gene approaches; genome-wide histone modifications (ChIP-Seq), transcriptome sequencing (RNA-Seq), multigenerational effects; imprinting; and epigenetic disease biomarkers.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2051 Children's Environmental Health (4 Credits)
Typically offered Fall and Spring
Provides in-depth understanding of the rapidly evolving field of children's environmental health. Covers key topics: state of current knowledge regarding exposures, issues for which consensus and controversy exists, or for which new knowledge and concerns are emerging, implications of current knowledge, research and uncertainties for environmental and public health, and for clinical policies/practices.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2052 Forensic Toxicology (4 Credits)
The purpose of this course is to provide basic theoretical knowledge as well as practical experience in forensic toxicology, which includes sample collection, processing, and analysis from any crime scene to the crime lab, drugs abuse toxicology, analytical chemistry, types of poisons, metals and plant poisoning, poisons of animal origin, and advances in molecular forensic biology which includes DNA technology. Students will also be provided with forensic toxicology, analytical and pathology laboratory experience.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2053 Community Partnerships Through the Lens of Environmental Scientists (2 Credits)
Biomedical research is often conducted without meaningful connections to impacts on communities, however, communities play critical roles in environmental, social, and biomedical research. This interactive course is designed to enhance equitable scientific partnerships by fostering critical thinking to understand challenges arising from cultural, economic and other diversities, mistrust, data ownership, psychosocial stress, maintaining equitable relationships, and difficult research questions.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2054 Fundamentals of Molecular Pathology (4 Credits)
Molecular pathology is an emerging discipline spanning pathology, molecular biology, biochemistry, proteomics and genetics. This course will delve into how molecular changes result in intracellular and intercellular changes, which ultimately contribute to initiation and/or progression of a disease. This course will provide the basics of molecular biology and cell biology to understand how changes may affect tissue organization and function. This course will revisit and add to your understanding of molecular biology, cell biology, and biochemistry. Many that study heavy metals, plastics, and pollutants focus on carcinogenesis. However, studies have demonstrated that other clinical disorders are associated with environmental hazards. Different exogenous materials alter the composition and function of different cell types contributing to different disorders. Moreover, lifestyle contributes to molecular changes that contribute to various disorders. Upon completion of the class, students should have a general understanding of how genetic and epigenetic changes contribute to the alterations in cell biology and tissue architecture/function. By the end of this course, each student should be able to connect how basic science research is used in the diagnosis of disease and how clinical studies contribute to formulating new hypotheses for basic science research to uncover predictive biomarkers for treatment or disease progression.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2055 Radiation Exposures and Health Effects (4 Credits)
This course introduces students to the general principles underlying the health effects of a variety of environmental radiation exposures. The purpose of this course is to provide basic theoretical and practical knowledge regarding different kinds of environmental radiation exposures and their subsequent health effects. Topics includes accidental or belligerent radiation exposure, dosimetry and quality control, countermeasures against radiation organ injury, and current scientific research. The goal is to familiarize students with various radiation exposure types and their health effects and and understanding of global impacts with public health concerns. Brief reviews of relevant methods and molecular approaches in radiation research and interpretation of results will be covered step by step in this course, as a supplement to an introductory radiation exposure lecture in the Principles of Toxicology class (EHSC-GA 2310). Students will also be provided with examples of radiation exposures in medical, occupational and imaging settings. Students will also be required to read for weekly classes and to complete homework assignments in radiation exposure and health effects.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2056 Environmental Disasters and Public Health (3 Credits)
The course will rely on lecture and small group work for students to gain in-depth understanding of factors contributing to and necessary responses to natural and man-made disasters. Each lecture will utilize a historical example of a natural or man-made disaster to, where applicable, describe issues relating to risk assessment and preparedness, environmental and human health consequences, and appropriate public health and medical responses. Specific emphasis will be applied to health consequences of disasters including acute illnesses caused by disaster-related exposures, exacerbations of chronic disease caused by interruptions in health services, risk of transmissible disease, mental health, trauma, and issues relating so disruptions of security and law and order. Where applicable, emphasis will be applied to the ongoing and escalating climate crisis – specifically its effect on disaster risk and response.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2100 Indep Study: Ergonomics & Biomech (1-12 Credits)
Typically offered occasionally
This course is intended to promote original research in the general fields of ergonomics and biomechanics. Study is carried out under the supervision of one or more faculty members. Students enrolled in this course are encouraged to utilize all appropriate laboratory and computer equipment. At the end of each semester, the student is expected to submit a written report.
Grading: GSAS Graded
Repeatable for additional credit: Yes

EHSC-GA 2101 Biomechanics (4 Credits)
Typically offered occasionally
This course consists of two parts. In the first part, the basic concepts of mechanics, such as force and torque, are introduced. These concepts are first applied to analyze relatively simple mechanical systems. Analogies between basic mechanical elements and human body parts are formed, and the principles of mechanics are then applied to analyze muscle and joint reaction forces controlling and coordinating the movements of major joints of the human musculoskeletal system. The second part of the course is devoted to the analyses of ?moving? systems with applications to human motion analyses and sports mechanics. The topics covered include description and causes of linear and rotational motion, one- and two-dimensional linear and angular kinematics and kinetics motion analysis as well as concepts of work, energy, power, impulse, and momentum and their application for the analysis of bodies in motion. Course lectures are carried out by solving examples and problems on the covered topics.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2111 Physical Biomechanics (4 Credits)
Typically offered occasionally
This course consists of two parts. In the first part, the laws of physics and basic concepts of biology, physiology, and mechanics are applied to explain the effect of applied forces and the biomechanical response of the tissues of the neuromusculoskeletal system. The second part of the course uses basic biomechanical concepts to describe motion undergone by various body/joint segments and the forces acting on these body parts during normal daily activities. To facilitate the understanding of the basic tissue/joint musculoskeletal biomechanics, selected case studies are used over the course of the semester.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2112 Applied Biomech in The Analysis of Human Perf (4 Credits)
Typically offered occasionally
This course builds on the Physical Biomechanics and Biomechanics courses. Its primary purpose is to explore the major processes and mechanisms underlying human motor performance and the pathomechanics of the most relevant occupation-related musculoskeletal disorders (MSDs). Biomechanical principles and their interaction with basic applied sciences are systemically introduced to produce a meaningful conceptual framework and facilitate hypothetical-deductive reasoning. In the first part of the course, specific topics covered include the review of physical biomechanics with increased emphasis on its interaction with other applied sciences, such as neuroscience and energetics physiology. The second part of the course focuses on multisegmental motion analysis and clinical biomechanics of selected case studies on occupation-related MSDs.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2121 Practicum in Ergonomics & Biomechanics I (4 Credits)
Typically offered occasionally
Focuses on methods and instruments for data collection and analysis of musculoskeletal disorders (MSDs). Uses lectures and hands-on projects to illustrate theoretical and practical issues with the use of various instruments. Emphasis is on appropriate methods of data collection and analysis of risk factors for MSDs?posture, force, and motion?using electromyography signals. Introduces students to the basic principles underlying the acquisition of a physiological signal via computer and to statistical methods for analysis and interpretation.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2123 Rsch Meth in Ergonomics and Biomech (4 Credits)
Typically offered occasionally
This course gives graduate-level students an overview of common study designs in scientific and medical research and specific knowledge in the application of these research methods to the field of ergonomics and biomechanics. Students also learn to critically evaluate scientific papers and draThis course gives graduate-level students an overview of common study designs in scientific and medical research and specific knowledge in the application of these research methods to the field of ergonomics and biomechanics. Students also learn to critically evaluate scientific papers and draw valid conclusions. The first part of the course is an overview of the scientific method and various study designs that can be used to investigate musculoskeletal disorders (MSDs). The second part focuses on specific topics relevant to research practice, such as issues in measurement, measurement instrument validation, statistical analysis, and the ethical conduct of research. Illustrations of the applications of these methods are presented in the context of ergonomic and biomechanical approaches to the evaluation and control of musculoskeletal disorders.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2131 Ergonomic Issues I: Physcl Factors in Wrkplc (4 Credits)
Typically offered occasionally
Ergonomics is the study of fitting the workplace to the capabilities of the human worker. Ergonomists apply knowledge from biomechanics, physiology, psychology, and engineering to the design of tasks, work organization, work environment, workstations, and tools. Taking a ? system approach? to the design of work, this course examines the interactions between the human worker and the equipment used at work. The course focuses on the design of the manufacturing process in the context of implementing an ergonomics program for injury prevention. In the first half, it demonstrates how the principles of physiology and biomechanics apply to workstation and tool design. The second half of the course covers industrial ergonomics applications: controlling cumulative trauma disorders of the upper extremities, office work, and manual material handling.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2132 Ergonomic Issues II: Physcl Factors in Wrkplc (4 Credits)
Typically offered occasionally
Covers environmental influences in the workplace that are relevant to the development of musculoskeletal problems. Emphasis is on recognizing and designing safe and productive work environments. Includes sensory-motor processes, temperature, whole-body and segmental vibration, noise, lighting, indoor air quality, and organizational factors. Enables students to appreciate environmental issues that affect ergonomic interventions in the workplace.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2133 Appl Ergonomic Methods (1-4 Credits)
Typically offered occasionally
This study project is intended to guide students in the application of ergonomic methods. The project is carried out under the supervision of one or more faculty members. Students may conduct the study in the field, at their workplace. Students are required to submit a written report for grading. The work may encompass up to two semesters. The topic and scope of the work are negotiated in advance with the program coordinator and approved by the faculty
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2303 Intro to Biostatistics (4 Credits)
Typically offered Fall
Introduction to probability and statistical methods utilized in the analysis and interpretation of experimental and epidemiological data. Statistical techniques associated with the normal, binomial, Poisson, t, F, and chi-squared distributions plus an introduction to nonparametric methods. Applications in biology, medicine, and the health sciences.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2307 Toxicology of Metals & Toxic Tort Litigation (4 Credits)
Typically offered occasionally
Metals represent serious and persistent environmental contaminants. This course describes the source of this contamination and examines the toxic effects of metals such as mercury, cadmium, arsenic, lead, vanadium, nickel, beryllium, cobalt, aluminum, chromate, selenium, and others. Each metal is considered with regard to its major toxic action. Mechanisms are emphasized.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2309 Environmental Carcinogenesis (4 Credits)
Typically offered occasionally
Introductory course that emphasizes current understandings of how environmental agents contribute to human cancer. The approach integrates information from human and experimental animal studies at the population, cellular, and molecular levels. Emphasis is on the basic mechanisms of cancer causation and how these understandings help to mitigate or prevent the disease.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2310 Principles of Toxicology (4 Credits)
Typically offered occasionally
Broad introduction to the science of toxicology, stressing basic concepts essential to the understanding of the action of exogenous chemical agents on biological systems. Principles underlying the absorption, metabolism, and elimination of chemicals are discussed. Toxicokinetics, specific classes of toxic responses, and experimental methods used to assess toxicity are reviewed.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2311 Organ System Toxicology (4 Credits)
Typically offered occasionally
Overview of the types of injury that may be produced in specific mammalian organs and organ systems by exposure to chemical toxicants.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2314 Research Models of Environment Exposures (2 Credits)
Typically offered occasionally
Research models of diseases that are associated with environmental exposures: discuss which models are optimal for molecular understanding of disease processes and for the development of new drugs and recommendations for environmental protection. Considerations of their limitations and how ethical issues are addressed.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2315 Environ Immunotoxicology (4 Credits)
Typically offered occasionally
Overview of the components and functions of the immune system in order to set the stage for a discussion of how toxicants impact the immune response and alter host susceptibility to disease. Provides students with the opportunity to investigate and discuss a relevant topic in the field of immunotoxicology.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2330 Adv Topics in Survival Analysis (4 Credits)
Typically offered occasionally
This course provides advanced topics in survival analysis in a seminar setting. The course includes a review of basic concepts followed by in-depth study of advanced methods. These methods include study of survival models with particular reference to time-dependent models, missing data, interval-censored data, recurrent event and multiple endpoints. Particular attention is given to interim analyses in the context of survival models in clinical trials. Bayesian approaches are also considered. Issues of survival analysis in observational data are also included. Readings include seminal research papers in survival analysis.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2332 Methods for The Analysis of Longitudinal Data (4 Credits)
Typically offered occasionally
This course covers statistical methods for analyzing longitudinal data, which mainly are collected in the form of repeated measurements over time. Topics include the linear model for longitudinal continuous data (e.g., multivariate normal model and mixed-effects models) and methods for analyzing longitudinal categorical data in the form of counts and binary data (e.g., generalized linear model and generalized estimating equations). Dropouts, missing mechanisms, and semiparametric methods are also discussed, with emphasis on newly proposed methods in the literature.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2336 Introduction to Statistical Inference I (3 Credits)
Typically offered Fall
This course introduces the central ideas, core principles and major methods in statistical inference illustrated by a wide range of examples. Topics include probability theory, statistical models, point estimation and asymptotic theory.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2337 Modern Methods for Causal Inference (2 Credits)
Typically offered occasionally
The goal of this course is to introduce a core set of modern statistical concepts and techniques for causal inference from randomized and observational studies, and to demonstrate how to use them to answer complex research questions in health research. The students will acquire knowledge on causal inference methods, including potential outcomes, directed acyclic graphs, and nonparametric structural equation models. This course focuses on aspects related to the identification of casual effects from randomized and observational studies. The course will also cover some estimation techniques such as inverse probability weighting, g-computation, matching, and doubly robust estimators based on machine learning. Time permitting, the course will cover one or more of the following topics: survival analysis, longitudinal data, mediation analyses, or effect modification. This course will use the free software R to perform all statistical analysis.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2338 Statistical Methods for Clinical and Translational Researach (2 Credits)
Typically offered Spring
This course will provide a statistical perspective on issues in the design, analysis, and interpretation of clinical and translational research studies and to learn how to design, conduct, analyze and report the results of clinical and translational research studies in the collaborative setting.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2339 Introduction to Bayesian Modeling (2 Credits)
Typically offered Fall
Provides practical introduction to Bayesian modeling, including data analysis and building models within the Bayesian framework, with special emphasis on hierarchical models. Primary emphasis on understanding modeling concepts and modeling processes, and analyses using R and BUGS; lesser emphasis on theoretical aspects of Bayesian statistics and technical details of Markov Chain Monte Carlo methods.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2340 Regression Modeling I (3 Credits)
Typically offered occasionally
Covers intermediate to advanced levels of regression models beyond basic linear regression knowledge to differentiate estimation and inference of regressions for independent data versus regressions for dependent data. Topics will include linear and generalized linear models, nonlinear models, nonparametric regressions, and variable selection.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2341 Statistical Learning (4 Credits)
Typically offered occasionally
Introduce students to basic data mining and machine learning tools, prepare them with skills of analyzing “big data”, and ensure that students are competent candidates in the emerging market of data scientists.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2342 Introduction to Statistical Inference II (3 Credits)
This course covers the central ideas, core principles and major methods in statistical inference including hypothesis testing, confidence sets, linear models, Bayesian approaches and nonparametric inference.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2343 Regression Modeling II (3 Credits)
Covers advanced levels of regression models for dependent data and time-to-event data. Topics will include linear and generalized mixed models, generalized estimation models, parametric and semiparametric survival models.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2344 Critical Thinking in Epidemiology (2 Credits)
One of the essential tasks practicing epidemiologists perform (whether in academic, government or private settings) is to critically review the literature. This course will draw from foundational courses in epidemiologic theories and methods. The overall purpose of this course is to prepare you to critically evaluate, integrate and synthesize bodies of literature pertaining to current questions in epidemiology. This is accomplished through in-depth analyses of current topics, with a particular focus on methodological issues in published studies that may pose limitations to our ability to answer the question of interest. Critical assimilation of the state of the literature is the foundation of epidemiologic research. This process is a key first step in the process of identifying new research questions, proposing and carrying out new studies, and ultimately contributing to the body of evidence that will guide public health policy considerations and decisions.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2345 Translating Research for Public Health Policy and Practice (2 Credits)
Typically offered Fall of even numbered years
This course aims to build competencies in applying epidemiologic research concepts and evidence to "real-world" policy and practice efforts in population and environmental health. The course will delve into the gaps that often exists between academic health research and the translation to policy and practice and will prepare students to begin overcoming these divides. Throughout the course, graduate students will work through practical challenges such as weighing scientific rigor and utility when working with diverse types of data and partners, balancing generation of findings for policy action versus for generalizable knowledge, translating findings for non-scientific audiences, and maintaining relationships with multiple stakeholders when conducting and disseminating research. Students will also work to build skills for effectively communicating and collaborating with non-research partners and audiences. The course will involve a mix of readings, lectures, guest speakers, discussions and hands-on assignments using data from public sources, and utilize case examples based on pressing public health issues. The overall objective is for students to gain perspective and pragmatic skills in applying their research and training beyond academia towards achieving impactful population and environmental health change. This course will rely heavily on participation and emphasize critical reading, writing and thinking, and informed debate with respect for a range of opinions. Themes of this course are relevant across a range of disciplines, including population health, social and environmental epidemiology, and public health policy.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2346 Computational Biostatistics (1 Credit)
Typically offered Fall of even numbered years
This course covers statistical computing methods needed for graduate-level biostatistics including topics in simulation, numerical optimization methods and Monte Carlos methods for planning studies.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 2347 Advanced Analytic Methods for Multi-omics Data Analysis and Integration (2 Credits)
Typically offered Fall of even numbered years
This course focuses on the analysis of high-dimensional omics data (including but are not restricted to transcriptomics, epigenomics, proteomics, metabolomics and microbiome data) generated through advanced high-throughput and massspectrum technologies in biomedical settings. The course will cover multi-omics experimental study designs, multivariate dimension reduction, multi-omics data analysis and multi-omics data integration techniques. We will introduce classic multivariate statistical methods including principal component analysis, projection to latent structures, canonical correlation analysis, factorization, feature selection and network analysis, as well as some recently developed statistical, machine learning, and AI methods. This course will use the free software R to perform all analysis.
Grading: GSAS Graded
Repeatable for additional credit: No

EHSC-GA 3001 Master's Thesis Research (1-6 Credits)
Typically offered all terms
This course provides MS students with dedicated time to complete their MS thesis research. This course is usually taken during the last semester of the program, it can be repeated once if needed.
Grading: GSAS Pass/Fail
Repeatable for additional credit: Yes

EHSC-GA 3002 Doctoral Thesis Research (1-12 Credits)
Typically offered occasionally
This course provides PhD students with dedicated time to undertake their PhD thesis research. This course can be repeated multiple times during the PhD program.
Grading: GSAS Pass/Fail
Repeatable for additional credit: Yes