DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCES

Programs
Chair: Melissa Gonzales, PhD, MS

Mission
The Department of Environmental Health Sciences conducts research and educates the next generation of public health professionals to address the impacts of environmental hazards.

About Environmental Health Sciences
The Department of Environmental Health Sciences engages in research and education to address physical, chemical, biological hazards in the environments in which people live, work, and grow. The health of communities is inextricably linked to the environment and environmental health risks are modified by climate change, compounded by natural and manmade disasters, and unequally distributed among communities.

Our goals are to:

• Equip the next generation of environmental public health leaders with the knowledge and tools to protect the health of vulnerable populations,
• Conduct cutting-edge research identifying health impacts and interventions to reduce risk from hazards across work, home, and ambient environments, and
• Ensure equitable opportunities for healthy environments through collaboration with our community partners — from our neighbors in New Orleans to across the Gulf South and across the world.

Graduate degrees in Occupational and Environmental Health, MPH and Occupational Health and Safety Management, MPH will not be admitting students for academic year 2023-2024.

Graduate certificates in Occupational and Environmental Health, Occupational Health and Safety Management, and Environmental Health will not be admitting students for academic year 2023-2024.

Graduate Degrees

• Disaster Management, MPH (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/disaster-management-mph/)
• Environmental Health Sciences, MSPH (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/environmental-health-sciences-msp/)
• Environmental Health Sciences, PhD (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/global-environmental-health-science-phd/)
• Industrial Hygiene, MSPH (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/environmental-health-industrial-hygiene-msp/)

Graduate Certificates

• Disaster Management and Resilience Certificate (Graduate) (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/disaster-management-resilience-certificate/)
• Disaster Management Certificate (Graduate) (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/disaster-management-certificate/)
• Industrial Hygiene Certificate (Graduate) (https://catalog.tulane.edu/public-health-tropical-medicine/environmental-health-sciences/industrial-hygiene-certificate/)

Courses

Global Environmental and Health Sciences (GEHS)
ENHS 6030 Survey of Environmental Health (3)
This course is designed as a survey course which introduces students to basic environmental health topics and it fulfills the school core requirement. The course focuses on environmental factors impacting human health and the environment. Sources of these factors, methods of identification, recognition, evaluation and regulatory framework control are discussed. Factors might include health hazards associated with contaminated water, food and air, vectors of disease, exposure to toxic chemicals, environmental justice, regulations, and safety in the work place.
ENHS 6110 Global Climate Change: Issues in Public Health Policy & Governance (3)
The objective of the course is to provide students with a thorough understanding of global climate change phenomenon, the public health issues associated with it, and the role of policy and governance in tackling this problem. In line with this objective, the course examines the scientific, political and socioeconomic factors influencing public health policy development, adaptation and compliance in response to the global climate change problem. The course also analyzes the current policy and governance intervention models, and sheds light on direction for the future.

ENHS 6300 Radiological Health (3)
This course is an introductory course in health physics, medical uses and university uses of ionizing radiation. The course includes radiation protection for both workers and general public. The course is designed to meet the needs Industrial Hygienists. Topics include nuclear reaction terminology, the interaction of alpha particles, electrons, and photons with matter; basic instrumentation for radiation protection, and the use of Poisson counting statistics, radiation medicine issues including radiation epidemiology, internal dissymmetry, use of the LLNL code Hotspot for dispersion calculations, and various advanced topics, including nuclear weapons effects.

ENHS 6320 Workplace Wellness (3)
Health, as it relates to the workplace, is created by two major forces; what employees bring with them into the workplace (e.g. personal resources, health practices, beliefs and attitudes) and the impact of the workplace on employees (e.g. organization of work in both a physical and psychological sense). Health promotion focuses on the elements that make up a healthy workplace and includes the physical environment, health practices and social environment & personal resources. This course focuses on the total well-being of individuals and groups within a corporate and community context. It emphasizes a holistic approach to achieving workplace, community, and personal wellness.

ENHS 6420 Global Food Safety and Public Health (3)
This course is designed for students who are interested in local, national, and international food safety. Food resources, production, biological, chemical and radiological contaminants are discussed. Focus will be on health effects resulting from exposure to contaminated food. Sanitary regulations/codes addressing food safety including inspection of food establishments, investigation of food outbreak diseases will also be discussed. Genetically modified foods will also be addressed. Site visit(s) to food establishments could be arranged (when possible) with Louisiana Sanitarian Services.

ENHS 6430 Disaster & Emergency Communication (3)
The course is a fast-paced, interactive course that focuses on the essential knowledge and tools needed to navigate the harsh realities of communicating to the public, media, and stakeholders during an intense public emergency, including terrorism. The course content will meet the crisis communication training needs of distinct groups (e.g., public health professionals, medical and health professionals, emergency response officials, community and civic leaders, the private business sector and volunteer organizations) at the community, regional and national level.

ENHS 6450 Climate & Public Health (3)
Future public health professionals should be aware of and understand the impact of climate on the health and well being of populations around the world. In this introductory level course, students will examine what climate change is, the environmental factors it influences, how those environmental factors impact health, who are the most vulnerable, how to deal with climate change from a public health perspective, and how we might answer future questions through evidence-based research. Current literature, reports, and relevant case studies inform class lectures, student-directed dialogue, and final presentations. The course will utilize expertise on various topics in addition the primary instructor. This course is an elective for all SPHTM students.

ENHS 6510 Water Quality Management (3)
The course presents the basic concepts concerning policy, evaluation, and implementation of pertinent water quality management issues. Topics of focus include: water quality standards and criteria; principles of water quality management; regulatory considerations; immunological aspects; eutrophication; ecotoxicology; diffuse pollution and global aspects of sustainable water quality control strategies.

ENHS 6540 Occupational Health (3)
This course provides a foundation in occupational health for physicians and professionals working in health and safety programs. The course provides an overview of: regulatory issues in occupational health; occupational health services, systems and policy; occupational toxicology and biological monitoring; occupational diseases including pulmonary dermatology; hearing conservation and hearing loss; workers compensation and return to work; and ergonomics. The course uses and interactive case study approach.

ENHS 6550 Environmental Health Management (3)
This course explains the fundamentals of environmental health and how they fit into the larger context of public health security. It highlights the elementary science of environmental exposure of humans to toxic chemicals and microbes, and in this way provides a context and basis for preventative policy and management responses to issues, policy development processes, policy tools and environmental laws-their weaknesses and strengths. It also introduces students to environmental management systems and practices. Students are given case-study based assignments to encourage their skill development in applied environmental health management.
ENHS 6560 Environmental Health Microbiology (3)
This course is designed to provide understanding about microbial pathogens of public health concern and the role of the environment, including water, waste, air and food, in the transmission of infectious diseases. We will explore specific pathogens that cause environmentally transmitted diseases, their detection using both conventional and advanced molecular methods, their prevention and control by technological and other measures, and how the health risks posed by these pathogens are assessed. This course focuses on emerging issues of pathogens in the environment at both local and global levels.

Prerequisite(s): ENHS 6030 or GEHS 6030.

ENHS 6600 Principles of Toxicology (3)
This course focuses on the fundamentals of toxicology and the mechanisms by which environmental and occupational chemical agents affect human health. The principles and mechanisms will be approached in three areas: General principles: Route of exposure; dose response; absorption, distribution, storage, metabolism and excretion; Effects on target organs: liver, kidney, blood, respiratory system and nervous system; and Application of the principles of toxicology using: solvents, pesticides and metals. At the end of this course, the student will be able to apply the principles of toxicology for compounds found in the environment and workplace.

ENHS 6620 Physical Agents & Ergonomic Hazards in the Workplace (3)
Occupational exposure to temperature extremes, abnormal pressure, noise, mechanical vibration, non-ionizing radiation, and cumulative trauma/ergonomics are discussed in lecture sessions. The fundamental physics, health effects, and occurrence of these agents, along with methods for evaluating the extent of exposure and approaches to controlling them are discussed in lectures and appropriate measurement instrumentation is demonstrated. A laboratory session on noise measurement is included. Applicable exposure standards, regulations, and guidelines are covered in detail.

Prerequisite(s): ENHS 6720 or GEHS 6720.

ENHS 6700 Principles of Safety (3)
This course is designed to give the student an introduction in the field of safety and prevention management. Broad areas and topics that are covered are management and accountability, policy development and evaluation, hazard identification, job safety analysis, safety training, applied engineering principles (slips, falls, cuts, electrocution, material handling, excavations, confined spaces crane use), emergency operations planning and social-behavioral aspects of safety.

ENHS 6720 Principles of Industrial Hygiene (3)
This course provides the student with an introduction into the field of Industrial Hygiene. Topics covered include an overview and historical perspective of Industrial Hygiene, anatomy and physiology of the skin and lungs, occupational diseases and inhalation toxicology, chemical agents, biohazards, ergonomics, indoor air quality, ventilation systems, lab safety, personal protective equipment, Hazard Communication and other OSHA standards. Examples from case studies work experience will be discussed. The course also allows for discussion of topics of interest to the class.

ENHS 6910 Environmental Aspects of Disaster Management (3)
This course examines the fundamentals of environmental health and consequence management through the lens of disaster situations, including technological, man-made, and natural disasters. Lessons learned from historical incidents and current threats alike are examined throughout the course. Environmental health and population health challenges that arise during disasters are thoroughly analyzed. Climate change and other influencing factors are discussed. Operational response models unique to disasters are explored. Preparedness and response frameworks are introduced. Current practice, literature, and relevant case studies inform class lectures, student-directed dialogue, and projects.

ENHS 6920 Environmental, Monitoring, Sampling & Analysis in a Disaster (3)
This course is designed to provide students with necessary knowledge and tools for sampling and monitoring of the environment following a disaster such as floods, hurricanes, earth quakes, explosions etc.. During this course, students will also be exposed to field sampling and become familiar with laboratory instruments used for chemical, biological and physical sample analysis.

ENHS 6930 Planning and Implementation in Disaster Management (3)
The United States is among other global communities that attempt to prepare its citizens for potential mass casualty events such as natural disasters, terrorism, or a pandemic flu outbreak. This course introduces disaster theory and overviews the United States' National Response Framework. Core population health issues that present during the management of disasters are examined. Developing preparedness at the local level is emphasized. Fundamental concepts of emergency management and leadership are discussed.

ENHS 6950 Psychosocial Aspects of Disaster (3)
The course covers the theoretical development, history, and empirical studies of the psychosocial dynamics and sequelae of disasters. Characteristics of environmental health disasters, reactions and risk factors, as well as trends in disaster mental health are examined. Emphasis is placed on inclusion of psychosocial considerations in the planning, preparation, and very early intervention phases of a disaster. Vulnerable populations are of particular interest in highly interactive case-based learning through reflection labs for application in situations such as natural disaster, environmental health crises, pandemic illness, or threats to national security. Baseline resilience planning is required of all students planning to work in disaster or emergency response fields.
ENHS 6960 Public Health Law (3)
Population-based preventative health intervention is a major focus of public health. Public health law speaks to the legal aspects of delivering this intervention to the society. This course introduces students to the functions and outcomes of public health protection and practice. It covers a variety of topics such as the public health powers of the federal, state and local governments; civil liberties in matters such as quarantine, isolation and mandated medical testing; access to healthcare; liability of healthcare workers; and international law on the duties and rights of countries to control the spread of infectious diseases.

ENHS 7110 Industrial Ventilation & Chemical Hazard Control (3)
This course covers the control and management of chemical hazards in the workplace and indoor environments through engineering, administrative change, and personal protective equipment. The selection, use, and limitations of respiratory protective equipment are discussed. Engineering controls covered include product substitution, process isolation, and ventilation. The fundamentals of design and operation of local exhaust and general dilution ventilation systems are covered in detail and include basic air flow, general dilution ventilation, exhaust hood design, duct design, fans, air cleaning and recirculation, system balancing, system evaluation and special ventilation systems. A laboratory session on evaluating ventilation system performance is included.

Prerequisite(s): ENHS 6720 or GEHS 6720.

ENHS 7230 Fundamentals of Project Management for EH&S (3)
This course focuses on management of environmental health and safety risks, as well as measurement and evaluation of industrial hygiene and safety performance. Specific course topics include environmental and hazardous materials management, emergency planning and response, crisis communication, accident investigation, the development and interpretation of risk assessments, risk perception and communication, economics and risk/benefit analysis, comparative risk assessment, laws and regulations pertaining to risk assessment, and management and the design of risk management plans. Report writing and interpretation are emphasized.

ENHS 7240 Applying Systems Thinking to EH&S (3)
This course complements and supplements ENHS 7230, Fundamentals of Project Management for EH&S. It is an introduction to methods of systematically integrating health and safety programs into standard management systems used by organizations. Topics emphasized include leadership, strategic planning, project management, management of multidisciplinary teams, regulatory affairs management, voluntary standards systems, professional ethics, labor relations, and "selling" health and safety initiatives to all levels of the organization and the public. Systems thinking is emphasized throughout the course. No prerequisites required.

ENHS 7260 Financial Aspects ES&H (3)
The purpose of this class is to teach students how to use economic and financial analyses to manage EHS programs by developing analytic and inductive reasoning skills that are prerequisites for becoming a successful manager. The course will address some basic financial managing concepts that mid-level EHS managers and professionals will commonly use or be exposed to in a business setting. These concepts include cost behaviors, profit analysis, budgeting, financial ratios, project economics and return investment analysis.

ENHS 7310 Occ Laws and Compliance (2)
This course is designed to introduce the most important EHS management systems for multinational companies from the US and other countries. The course introduces students to ISO-harmonized management systems. Students gain skills in making the transition from traditional numeric specifications of governmental command-and-control regulations to ISO-harmonizing auditing systems, involving root cause analyses of system requirements.

ENHS 7400 Field/Lab Applications of Environmental Health Practice (3)

ENHS 7500 Air Sampling & Analysis (3)
The principles and techniques for measuring and evaluating airborne contaminants in the work and community environments are presented in lectures and practiced in laboratory sessions. Covered topics include air flow measurements, aerosol science, particulate sampling with and without size separation, optical microscopy, active and passive sampling of gases and vapors, direct reading instruments, stack sampling, atmospheric dispersion modeling, and sampling strategy and statistical data analysis.

Prerequisite(s): BIOS 6030* or SPHL 6050*.
* May be taken concurrently.

ENHS 7510 Emerging Issues in Water Qual (3)
Burgeoning human population and urbanization is creating increased demands on fresh water resources and generating larger and more concentrated waste streams. Droughts throughout many parts of the world also have placed unique challenges on historically abundant river systems. Therefore, many communities are considering the utilization of alternative water resources, including desalination of brackish waters and the reuse of wastewater for potable and non-potable applications. This course will investigate, discuss, and debate major emerging water quality issues which threaten our water sustainability and the regulatory paradigms to address these challenges. Specific issues include emerging opportunistic premise plumbing pathogens, endocrine disrupting chemicals, pharmaceuticals, unregulated disinfection by-products, perfluorinated organic compounds, algal toxins, and others.

Prerequisite(s): ENHS 6030 and 6510.
ENHS 7550 Human Biomonitoring & Health (3)
This advanced applied course introduces human biomonitoring (HBM) concepts and approaches for understanding the myriad ways humans interact with the environment, primarily from the perspective of chemical exposures. Students will gain skills needed to design and conduct population-level biomonitoring studies. The course involves a literature critique and practice in designing biomonitoring studies that address environmental health issues relevant to public health and policy.

Prerequisite(s): ENHS 6030 and 6600.

ENHS 7620 Health Risk Assessment (3)
What is risk? How are exposures to environmental chemicals deemed risky (or not)? This course will cover the rationale and application of health risk assessment in the context of chemical toxicology and human health. Principles of dose-response and the multi-step process in human health non-cancer and cancer risk assessments will be covered. Quantitative deterministic and probabilistic methods and tools will be used in conjunction with risk interpretation, presentation, and communication.

Prerequisite(s): ENHS 6600 or GEHS 6600.

ENHS 7750 Environmental Policy (3)
The course introduces students to the concepts of public health policy with an emphasis on environmental health. The course describes the relationship among public science, policy, and practice and demonstrates the application of this relationship through a series of real cases in environmental health laws, policies, regulations and statutes in the context of public health. Through “hands-on” experience, students examine the policy implications of contemporary environmental public health problems.

ENHS 7990 Independent Study (1-3)
Masters students and advisor select a topic for independent study and develop learning objectives and the expected written final product.

ENHS 8100 Advanced Environmental Health (3)
Advanced Environmental Health is a doctoral level course that is restricted to students who are admitted to doctoral programs. The course is taught by the departmental members who have extensive research experience. Students will be challenged with contemporary research problems in the field of environmental health that span topics that include environmental health in disaster situations, identifying effects of environmental chemicals, and biological contaminants in the water supply. The course is designed to provide a unified, broad, and advanced experience in environmental health issues for doctoral students.

ENHS 8200 Environmental Health Methods (3)
Environmental Health Methods is a doctoral level course for students enrolled in doctoral programs. The course is taught by the departmental members with active environmental health research programs. Students select an area for study and work closely with a faculty member to 1) identify an environmental health research question that can be approached within a semester, 2) review the pertinent literature on the topic and form a testable hypothesis, 3) develop and employ the appropriate methodological approaches, 4) prepare and analyze data, 5) identify an appropriate journal or other publication forum, and 6) complete a manuscript or report in the appropriate format.

Prerequisite(s): BIOS 6040, EPID 7120 and ENHS 8100.

ENHS 8990 Doctoral Independent Study (1-3)
Doctoral students and advisor select a topic for independent study and develop learning objectives and the expected final written product.