M.P.H. in Environmental Health Sciences
Program and Course Descriptions

The Masters of Public Health (MPH) degree with a concentration in Environmental Health Sciences is a discipline that investigates biological, chemical, and physical factors that affect the health of a community. Focusing on interrelationships between people and their environments, the discipline seeks to translate environmental health research into effective public health practice; promote human health and well-being; and foster safe and healthy environments. Environmental health scientists address issues such as the control of epidemic diseases, food and water safety, treatment and disposal of liquid and solid wastes, elimination of workplace stressors, and the role of the environment in chronic illnesses. They also tackle long-range problems, including the effects of global warming, toxic chemicals and radioactive waste, acidic deposition and depletion of the ozone layer on human health.

There are currently excellent career opportunities for MPH graduates with a concentration in Environmental Health Sciences. The demand for master’s level public health professionals in environmental health will grow even greater with the aging workforce; approximately 40% of environmental health practitioners are projected to retire in the next 5-10 years (APHA, 2004).

Table 1 presents competencies expected of all students who complete an MPH with a concentration in Environmental Health Sciences.

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<tr>
<th>Table 1: Public Health Competencies: MPH Program with Concentration in Environmental Health Sciences</th>
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<tr>
<td>Upon graduation a student with an MPH in Environmental Health Sciences should be able to…</td>
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<tr>
<td>1) Specify approaches for assessing, preventing, and controlling environmental and occupational hazards that pose risks to human health and safety. *</td>
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<td>2) Describe the direct and indirect human, ecological, and safety effects of major environmental and occupational agents. *</td>
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<td>3) Describe genetic, physiologic, and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental and occupational hazards. *</td>
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<td>4) Discuss various risk management and risk communication approaches in relation to issues of environmental justice and equity. *</td>
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<td>5) Explain the general mechanisms of toxicity in eliciting a toxic response to various environmental exposures. *</td>
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<td>6) Discuss ethical considerations of and disparities in environmental-occupational health.</td>
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<td>7) Specify current environmental risk assessment methods. *</td>
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<td>8) Develop a testable model of environmental insult. Definition: Synthesize environmental-occupational health knowledge to design and evaluate environmental-occupational health policies, programs and research. Integrate, synthesize and apply theory to practice in the context of a research study, policy development, and public health systems development.*</td>
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<td>9) Describe federal and state regulatory programs, guidelines, and authorities that control environmental-occupational health issues.</td>
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The MPH with a concentration in Environmental health sciences is a 46-credit professional degree. All MPH students will complete five core courses, seven courses in their cognate area, an internship, and a capstone project or thesis. Students completing a project take two elective courses and students completing a thesis take one elective course and apply one elective toward the thesis. Table 2 presents courses required for the MPH with a concentration in Environmental Health Sciences.

<table>
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<tr>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>MIEH 600  Foundations of Environmental Health</td>
<td>3</td>
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<tr>
<td>EPIB 610  Foundations of Epidemiology</td>
<td>3</td>
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<tr>
<td>EPIB 650  Biostatistics I</td>
<td>3</td>
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<tr>
<td>HLSA 601  Introduction to Health Systems</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 665  Health Behavior I</td>
<td>3</td>
</tr>
<tr>
<td>MIEH 740  Risk Assessment</td>
<td>3</td>
</tr>
<tr>
<td>MIEH 720  Principles of Toxicology</td>
<td>3</td>
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<tr>
<td>MIEH 770  Law and Policy in Environmental Health</td>
<td>3</td>
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<tr>
<td>MIEH 771  Exposure Assessment</td>
<td>3</td>
</tr>
<tr>
<td>MIEH 780  Environmental and Occupational Hygiene</td>
<td>3</td>
</tr>
<tr>
<td>EPIB 641  Public Health and Research Ethics</td>
<td>1</td>
</tr>
<tr>
<td>EPIB 651  Biostatistics II</td>
<td>3</td>
</tr>
<tr>
<td>MIEH 785  Internship in Public Health</td>
<td>3</td>
</tr>
<tr>
<td>MIEH 786  Capstone Project in Public Health OR MIEH 799 Thesis</td>
<td>3 or 6</td>
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Electives (3 or 6 credits) (see options below)

Total Credits 46

Recommended Electives for MPH with Environmental Health Sciences Concentration
MIEH 730 Environmental Justice, Built Environment, and Health Disparities
MIEH 735 Food Toxicology
MIEH 760 Spatial Epidemiology
MIEH 773 Foodborne, Waterborne and Airborne Infectious Diseases
MIEH 788 Critical Readings
MIEH 789 Independent Study

EPIB 620 Chronic Disease Epidemiology
EPIB 621 Infectious Disease Epidemiology
EPIB 611 Intermediate Epidemiology (3 credits)
EPIB612 Epidemiologic Study Design
EPIB652 Categorical Data Analysis

Other or additional electives may be taken with the consent of the student’s advisor.
Course Descriptions:
The core and cognate courses for the MPH concentration in Environmental Health Sciences that are currently being offered are listed below.

EPIB 610 Foundations of Epidemiology: Introduction to the discipline of epidemiology and its applications to health issues and practices. Basic epidemiologic concepts and methods will be covered.

EPIB 650 Biostatistics I: Basic statistical concepts and procedures for Public Health. Focuses on applications, hands-on-experience, and interpretations of statistical findings.

EPIB 651 Biostatistics II: Introduction to a variety of statistical tools with applications in public health, including one- and two-sample inference, nonparametric methods, categorical data, ANOVA, simple and multiple regression.

HLSA 601 Introduction to Health Systems: Management and leadership skills for effective public health planning, organization, management and administration. Emphasis is on the role of institutions in learning and behavioral change process, organizational theory, administration management, and coordinating provision of community health services.

HLTH 665 Health Behavior I: The psychological, social psychological, and sociological theories of health behavior. The relation of health knowledge, beliefs, attitudes, intentions, and behavior to preventive, illness, sick-role, and health utilization behaviors.

EPIB641 Public Health and Research Ethics: Overview and discussion of ethical issues that face public health practitioners and researchers.

MIEH600 Foundations of Environmental Health: Overview of the chemical, physical and biological hazards present in our living and working environment and their effects on human health. Topics include: exposure assessment, industrial hygiene and safety, pesticides, community and indoor pollution, food-borne diseases, solid and hazardous wastes, water resources, risk assessment, ecological issues and environmental laws.

MIEH 720 Principles of Toxicology: An overview of the major principles and methods of toxicology. Topics will include mechanisms of toxicity, factors that affect toxicity (absorption, distribution, metabolism and excretion), biotransformation, toxicokinetics, in vivo and in vitro toxicity testing, mechanisms of carcinogenesis, neurotoxicants, hepatotoxicants, and kidney toxicants.

MIEH730 Environmental Justice, Built Environment, and Health Disparities: An in-depth analysis of environmental justice and environmental racism in the US and internationally. Explaining environmental sciences using concepts of civil rights and social justice to more fully understand the existing health disparities and how the built environment contributes to them.

MIEH 735 Food Toxicology: An introduction to basic concepts in toxicology in relation to toxic food contaminants and additives; both synthetic and naturally occurring. Focus on exposure
routes, molecular targets and susceptible individuals. Also includes regulatory toxicology with respect food toxins.

**MIEH 740 Risk Assessment:** Review of the major methods of human and ecological risk assessment conducted by the U.S. Environment Protection Agency. Emphasis on sources of uncertainty.

**MIEH 760 Spatial Epidemiology:** Students are provided with an introduction to spatial resources and methods specific to public health, with an emphasis on epidemiology and environmental applications. Students will be introduced to spatial resources, concepts, and tools relevant to public health research and practice. They will acquire skills to interpret, evaluate, and design basic public health spatial research projects; and to conduct simple spatial analyses.

**MIEH 770 Law and Policy:** Overview of laws that affect the environment, and the various ways in which businesses are regulated by the government in the interest of protecting the environment. International, Federal, state, and local laws and regulations related to the protection of human health and the regulation of environmental containments, including biological, physical and chemical factors affecting community health. Examination of the interactions between and differing responsibilities of various agencies enforcing environmental laws and regulations.

**MIEH 771 Exposure Assessment:** Approaches and methods for determining exposure to environmental contaminants. Biomonitoring and genetic methods to detect recent exposures. Optimizing exposure assessment.

**MIEH 773 Foodborne, Waterborne and Airborne Infectious Diseases:** In-depth study of biological contaminants in the environment and their impacts on human health. Sources, dissemination and detection of biological contaminants, and their transmission to humans via food, water, air and other environmental media. Methods of disease prevention, including approaches to ensuring safe food and drinking water supplies.

**MIEH 780 Environmental and Occupational Hygiene:** A synthesis of epidemiology, toxicology, exposure science, risk assessment, and policy. Emphasis will be on methods for prevention and control of injury and illness, the hierarchy of controls, current hot topics, and selected environmental and occupational diseases and injuries.

**MIEH 785 Internship in Public Health:** Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student’s background and career goals. Prerequisite: Permission of the Department.

**MIEH 786 Capstone Project in Public Health:** Capstone experience providing opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of a project relevant to public health under the direction of an advisor. Prerequisite: Permission of the Department.
MIEH 688 Seminar in Environmental Health Sciences Critical Analysis of Research Methods: Invited and in-house research seminars from guests, faculty members and students, as well as journal article discussions. (Listed as MIEH 698A until spring semester 2012)

MIEH 788 Critical Readings: In-depth examination and critical discussion of the current literature relevant to environmental health in a seminar format.

MIEH 789 Independent Study: Individual reading and/or research under a specific faculty member.

MIEH 799 Master’s Thesis Research: Individual instruction course: contact department or instructor to obtain section number.

Sample Student Schedule
Below is a table showing how a typical MPH student with a concentration in Environmental Health can complete the required coursework as a full-time student. Variations of this should be discussed with the advisor at the outset and updated each semester. Part time students should discuss their program development with their advisor. All core MPH courses (in italics) are taught every semester and usually are also offered in the summer. However, MIEH 600, EPID 610 and EPID 650 are basic core items for students in Environmental Health and are usually recommended to be taken at the outset.

YEAR ONE

Fall 2013

MIEH 600 – Foundations of Env Health (3)
EPID 610 - Foundations of Epid (3)
EPID 650 – Biostat 1 (3)
EPIB641 Public Health and Research Ethics (1)

Spring 2014

MIEH 720 – Toxicology (3)
MIEH 771 - Exposure Assessment (3)
MIEH 770 – Law and Policy (3)
EPID 651 – Biostats II (3)

YEAR TWO

Fall 2014

MIEH 740 – Risk Assessment (3)
MIEH 780 - Envir Occupational Hygiene (3)
HLTH 655 – Health Behavior (3)
Elective 1 (3)

Spring 2015

HLSA 601 - Intro to Health Systems (3)
MIEH 785 – Internship (3)
MIEH 786/799 Capstone or Thesis (3 or 6)
Elective 2 *(3)

* only if doing capstone

Updated August 15, 2013
V. Applications and Admissions
To apply, applicants must submit: Undergraduate transcripts, Graduate transcripts (if applicable), Graduate Record Examination (GRE) scores obtained within the last 5 years, letters of recommendation from 3 persons competent to judge the applicant’s probability of success in graduate school, and the Graduate School essay describing professional goals and relevant work and research experience. Students can submit applications at any time of the year, but should submit application materials for the fall semester by January 15th for best consideration, later applicants will be considered if places remain open. This program does not accept applications for Spring semester admission.

In addition to Graduate School requirements, admission decisions for the MPH program will be based on the quality of previous undergraduate and graduate course work, strength of GRE scores, the relevance of prior work and research experience, and the congruence of professional goals with those of the program.

VI. Student technology fluency
MPH students will acquire knowledge and competence relating to a wide range of technology skills, including retrieving, storing, and presenting public health information and data for research and practice. Required coursework will introduce students to geographic information systems used in public health surveillance, environmental health tracking systems, “smart home” technologies, and mobile devices for the continuous monitoring of chronic health problems. Students will also master innovative learning and information technologies (e.g., podcasting, weblogs) for disseminating health information.