College of Public Health
Competencies
Complete listing of core and program-specific competencies

Professional Programs
I. MPH Program Competencies
   a. Core Competencies (all MPH students must meet)
   b. Biostatistics
   c. Epidemiology
   d. Health Administration and Policy
   e. Health Promotion Sciences
   f. MPH/MSW
   g. Interdisciplinary
   h. Occupational and Environmental Health
   i. Public Health Preparedness and Terrorism Response

II. MHA Program Competencies

III. Doctor of Public Health (DrPH) Program Competencies

Graduate Programs
IV. Master of Science Program Competencies
   a. Biostatistics
   b. BS/MS in Biostatistics
   c. Epidemiology
   d. Health Promotion Sciences
   e. Industrial Hygiene/Environmental Health Sciences

V. Doctor of Philosophy Program Competencies
   a. Biostatistics
   b. Epidemiology
   c. Health Promotion Sciences
   d. Occupational and Environmental Health
I. **MPH Program Competencies**

a. **Core Competencies (all MPH students must meet)**

Core 1  Describe the roles biostatistics serves in the discipline of public health (A.1)

Core 2  Apply and interpret results from descriptive and inferential methodologies according to the type of study design, measurement scale, and available data for answering a particular research question (modification of A.4 and A.7)

Core 3  Describe the direct and indirect human, ecological and safety effects of major environmental and occupational agents (modification of B.1)

Core 4  Explain the importance of epidemiology, and aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues (modification of C.3. and C.4)

Core 5  Calculate basic epidemiology measures and draw appropriate inference from epidemiologic data (modification of C.7 and C.9)

Core 6  Identify the main components and issues of the organization, financing and delivery of health services and public health systems in the US (D.1)

Core 7  Discuss the policy process for improving the health status of populations (D4)

Core 8  Identify basic theories, concepts and models from a range of social and behavioral disciplines that are used in public health research and practice (E.1)

Core 9  Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health activities (F.7)

Core 10  Describe the roles of, history, power, privilege and structural inequality in producing health disparities (G.1)

Core 11  Promote high standards of personal and organizational integrity, compassion, honesty and respect for all people (J.5)

Core 12  Describe how social, behavioral, environmental, and biological factors contribute to specific individual and community health concerns (K.1)
## b. Biostatistics MPH

### BIOSTATISTICS

<table>
<thead>
<tr>
<th>Biostat 1</th>
<th>Use computer software for data entry and database management and use computer programs for summarizing, analyzing and displaying public health or biomedical research results (modification of A.8)</th>
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<tr>
<td>Biostat 2</td>
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<td>Biostat 3</td>
<td>Read the statistical methods reported in public health and medical literature and comment on their appropriateness to the study design and research questions (modification of A.9)</td>
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<td>Biostat 4</td>
<td>Compare and contrast advantages and disadvantages in the use of nonparametric or parametric statistical procedures, and in the use of univariate, bivariate and multivariable procedures (modification of A.3 and A.6)</td>
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### EPIDEMIOLOGY

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<th>Epi 1</th>
<th>Identify, access, and integrate sources of health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions (modification of C.1)</th>
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<td>Epi 3</td>
<td>Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies (modification of C.9 and C.10)</td>
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<td>Epi 4</td>
<td>Assess and explain strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias on inference from epidemiologic studies (modification of C.9 and C.10)</td>
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### PUBLIC HEALTH PROFESSIONAL PRACTICE

| Prof Biostat: | Become an integral team member, as a junior analyst or research assistant, actively participating in identifying and formulating public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods (modification of A.1, J.3, J.10) |
c. Epidemiology MPH

BIOSTATISTICS

Biostat 1  
Use computer software for data entry and database management and use computer programs for summarizing, analyzing and displaying public health or biomedical research results (modification of A.8)

Biostat 2  
Determine the most appropriate method of statistical analysis reflecting a given question of interest, the implemented study design and the available data, implementing preferred methodological alternatives to commonly used statistical methods when their assumptions are not met (modification of A.3 and A.7)

Biostat 3  
Read the statistical methods reported in public health and medical literature and comment on their appropriateness to the study design and research questions (modification of A.9)

EPIDEMIOLOGY

Epi 1  
Identify, access, and integrate sources of health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions (modification of C.1)

Epi 2  
Describe the pathophysiology, natural history, and relative frequencies of health conditions that are major causes of morbidity and mortality

Epi 3  
Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies (modification of C.9 and C.10)

Epi 4  
Assess and explain strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias on inference from epidemiologic studies (modification of C.9 and C.10)

PUBLIC HEALTH PROFESSIONAL PRACTICE

Prof Epi:  
Become an integral team member, as a junior epidemiologist or research assistant, actively participating in identifying public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods to address the questions of interest (modification of A.1, J.3, J.10)
d. Health Administration and Policy MPH

HAP 1  Describe the legal and ethical bases for public health and health services (D.2)

HAP 2  Apply the principles of program planning, development, budgeting, management and evaluation in organizational and community initiatives (D.5)

HAP 3  Apply principles of strategic planning and marketing to public health (D.6)

HAP 4  Apply quality and performance improvement concepts to address organizational performance issues (D.7)

HAP 5  Apply "systems thinking" for resolving organizational problems (D.8)

e. Health Promotion Sciences MPH

HPS 1  Apply theories, concepts, and models from a range of social and behavioral disciplines that are used in public health research and practice (modification of E.1)

HPS 2  Analyze individual, organizational, and community concerns, assets, resources and deficits for social and behavioral science interventions (modification of E.3)

HPS 3  Apply ethical principles to public health program planning, implementation and evaluation (E.9)

HPS 4  Evaluate multiple targets and develop multiple levels of intervention for social and behavioral science programs and/or policies (modification of E.10)

HPS 5  Apply basic concepts and skills involved in culturally appropriate community engagement and empowerment with diverse communities (modification of G.5)

HPS 6  Demonstrate principles of community-based participatory research to improve health in diverse populations (modification of G.6)

HPS 7  Differentiate among goals, measurable objectives, related activities, and expected outcomes for a public health program (K.5)

HPS 8  Differentiate the purposes of formative, process, and outcome evaluation (K.6)
f. Health Promotion Sciences MPH and Social Work MSW

HPS 1  Apply theories, concepts, and models from a range of social and behavioral disciplines that are used in public health research and practice (modification of E.1)

HPS 2  Analyze individual, organizational, and community concerns, assets, resources and deficits for social and behavioral science interventions (modification of E.3)

HPS 3  Apply ethical principles to public health program planning, implementation and evaluation (E.9)

HPS 4  Evaluate multiple targets and develop multiple levels of intervention for social and behavioral science programs and/or policies (modification of E.10)

HPS 5  Apply basic concepts and skills involved in culturally appropriate community engagement and empowerment with diverse communities (modification of G.5)

HPS 6  Demonstrate principles of community-based participatory research to improve health in diverse populations (modification of G.6)

HPS 7  Differentiate among goals, measureable objectives, related activities, and expected outcomes for a public health program (K.5)

HPS 8  Differentiate the purposes of formative, process, and outcome evaluation (K.6)

g. Interdisciplinary MPH

Inter 1  Competently present through different information technologies and media channels to different audiences that strategically exchange information to achieve specific objectives (modification of F.7, F.8, F.9, and F.10)

Inter 2  Understand and apply concepts of cultural diversity in its context of public healthcare practice (modification of G.5 and G.6)

Inter 3  Demonstrate team building, negotiation, and conflict management skills (H.5)

Inter 4  Demonstrate ethics, values, and social justice to public health practice (modification of J.2, J.5, and J.8)

Inter 5  Demonstrate skills in qualitative and quantitative evaluation methods (modification of K.7)
Inter 6  Be able to demonstrate system thinking among human and social systems (modification of L.8)

h. Occupational and Environmental Health MPH

OEH 1  Explain genetic, physiologic, and psychosocial factors that affect susceptibility to adverse health outcomes following exposure to environmental hazards (modification of B.2)

OEH 2  Interprets federal and state regulatory programs, guidelines, and authorities that control environmental health issues (modification of B.3)

OEH 3  Utilizes and applies methods and tools for assessing environmental risks (modification of B.4)

OEH 4  Applies methods for assessing, preventing and controlling environmental hazards that pose risks to human health and safety (modification of B.5)

OEH 5  Explains the general mechanisms of toxicology in eliciting a toxic response to various environmental exposures (B.6)

OEH 6  Designs risk management and risk communication approaches in relation to issues of environmental justice and equity (modification of B.7)

OEH 7  Applies theory and strategy-based communication principles across different settings and audiences (F.4)

OEH 8  Evaluates how biological, chemical and physical agents might affect human health (modification of I.7)

OEH 9  Applies biological principles to development and implementation of disease prevention, control, or management programs (I.8)

i. Public Health Preparedness and Terrorism Response MPH

PHPTR 1  Solve problems under emergency conditions (1.1)

PHPTR 2  Facilitate collaboration with internal and external emergency response partners (1.3)

PHPTR 3  Use principles of crisis and risk communication (2.2)

PHPTR 4  Report information potentially relevant to the identification and control of an emergency through the chain of command (2.3)

PHPTR 5  Contribute expertise to a community hazard vulnerability analysis (HVA) (3.1)
PHPTR 6  Contribute expertise to the development of emergency plans (3.2)

PHPTR 7  Employ protective behaviors according to changing conditions, personal limitations, and threats (4.2)

II.  **MHA Program Competencies**

MHA A.  Synthesis and evaluation of the healthcare system, healthcare management, and issues related to:

1. healthcare organizations,
2. access to care,
3. financing healthcare,
4. human resources,
5. financial management,
6. strategic planning and thinking,
7. quality improvement, and
8. legal and regulatory matters.

MHA B.  Communication skills including:

1. Characterizing and utilizing appropriate forms and standards of communication methods applicable in professional healthcare settings;
2. Establishing best practices of communication skills; and
3. Effectively identifying and responding to the audience and its wants, needs, interests, and beliefs.

MHA C.  Critical thinking, analytical skills, and problem-solving abilities including:

1. Using quantitative, statistical and financial analyses to solve problems;
2. Creating and using strategic planning and strategic thinking to discern among alternatives and make recommendations; and
3. Applying quality improvement techniques to analyze and change organizational outcomes.

MHA D.  Leadership, Professionalism, and Ethics including:

1. Engaging people, organizations, and key stakeholders when developing goals and executing plans;
2. Mobilizing teams, using negotiating skills, and accounting for individual and organizational pressures and needs;
3. Demonstrating integrity in personal and organizational practices, respecting diverse opinions, and holding themselves and others accountable for their actions; and
4. Using a corporate ethical decision-making process in a healthcare setting and apply ethical principles and policy statements to resolve ethical issues.
III. Doctor of Public Health (DrPH) Program Competencies

DrPH-ACO 1  Present positions on health issues and policy (modification A1)

DrPH-ACO 2  Influence health policy and program decision-making based on scientific evidence, stakeholder input, and available data (modification of A2)

DrPH-ACO 3  Establish goals, timelines, funding alternatives, and strategies for influencing policy initiatives (A5)

DrPH-ACO 4  Use consensus-building and negotiation techniques and develop strategies to build public and political support for programs and policies (modification of A3 and A6)

DrPH-ACO 5  Conduct community-based participatory intervention and research projects (C3)

DrPH-PC 1  Create informational and persuasive communications (B5)

DrPH-PC 2  Propose recommendations for improving communication process (B9)

DrPH-PC 3  Differentiate among the administration, ethical, and quality assurance dimensions of research and practice (modification of G2)

DrPH-PC 4  Demonstrate cultural sensitivity when engaged in discourse and research with communities (modification of G7)

DrPH-CA 1  Apply theoretical and conceptual frameworks from multiple disciplines in the design and implementation of programs, policies, and systems (modification of D1)

DrPH-CA 2  Interpret quantitative and qualitative data following current scientific standards (D2)

DrPH-CA 3  Design needs and resource assessments for organizations, communities, and populations (modification of D4)

DrPH-CA 4  Synthesize information from multiple sources for research and practice (D5)

DrPH-CA 5  Evaluate the performance and impact of health programs, policies, and systems (D6)

DrPH-LM 1  Communicate an organization’s missions, shared vision, and values to stakeholders (E1)

DrPH-LM 2  Develop teams for implementing health initiatives (E2)

DrPH-LM 3  Collaborate with diverse groups (E3)

DrPH-LM 4  Influence others to achieve high standards of performance and accountability (E4)

DrPH-LM 5  Guide and lead organizational decision-making and planning based on internal and external evaluation and research (modification of E5)
DrPH-LM 6  Implement strategic planning processes (F1)
DrPH-LM 7  Deploy quality improvement methods (F5)
DrPH-LM 8  Establish a network of relationships, including internal and external collaborators (F8)
DrPH-LM 9  Evaluate organizational performance in relation to strategic and defined goals (F9)

IV. **Master of Science (MS) Program Competencies**

a. **Biostatistics MS**

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**EPIDEMIOLOGY**

**Core 4**
Explain the importance of epidemiology, and aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues

**Epi 1**
Identify, access, and integrate sources of health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions.

**Core 5**
Calculate basic epidemiology measures and draw appropriate inference from epidemiologic data

**Epi 3:**
Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies

**Epi 4:**
Assess and explain strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias when drawing inference from epidemiologic studies

**DISSEMINATION OF RESEARCH RESULTS**

**BComm 1:**
Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health or biomedical research activities

**BComm 2:**
Design and implement a critical review of applied public health, biomedical, and statistical research literature related to a specific topic or question of interest, critique the reported methods, and synthesize the findings

**RESEARCH PROFESSIONAL PRACTICE**

**Core 1:**
Communicate the roles biostatistics serves in the discipline of public health and biomedical research

**Prof Biostat:**
Become an integral team member, as a junior analyst or research assistant, actively participating in identifying and formulating public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods

**Prof Ethics:**
Demonstrate responsible conduct of research practices related to data acquisition and sharing, collaborative research, ethical research with human subjects, disclosure and management of conflicts of interest, avoidance of research misconduct, and responsible publication and authorship practices
b. BS/MS in Biostatistics

STATISTICAL THEORY

StatTheory 1: Explain the theoretical background of commonly used statistical procedures

STATISTICAL COMPUTING

Comp 1: Use computer software programs such as Excel, Access and REDCap for data entry and database management

Comp 2: Use computer programs such as SAS and JMP, computing software environments such as R, and/or computer programming languages for processing, summarizing, analyzing and displaying complex public health or biomedical data and research results

APPLIED BIOSTATISTICAL METHODS

Core 2: Apply and interpret results from descriptive and inferential methodologies according to the type of study design, measurement scale, and available data for answering a particular research question

Biostat 2: Determine the most appropriate method of statistical analysis reflecting a given question of interest, the implemented study design and the available data, implementing preferred methodological alternatives to commonly used statistical methods when their assumptions are not met

Biostat 3: Read the statistical methods reported in public health and medical literature and comment on their appropriateness to the study design and research questions

Biostat 4: Compare and contrast advantages and disadvantages in the use of nonparametric or parametric statistical procedures, and in the use of univariate, bivariate and multivariable procedures

EPIDEMIOLOGY

Core 4: Explain the importance of epidemiology, and aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues

Epi 1: Identify, access, and integrate sources of health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions.

Core 5: Calculate basic epidemiology measures and draw appropriate inference from epidemiologic data
Epi 3: Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies.

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DISSEMINATION OF RESEARCH RESULTS

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RESEARCH PROFESSIONAL PRACTICE

Core 1: Communicate the roles biostatistics serves in the discipline of public health and biomedical research.

Prof Biostat: Become an integral team member, as a junior analyst or research assistant, actively participating in identifying and formulating public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods.

Prof Ethics: Demonstrate responsible conduct of research practices related to data acquisition and sharing, collaborative research, ethical research with human subjects, disclosure and management of conflicts of interest, avoidance of research misconduct, and responsible publication and authorship practices.

c. Epidemiology MS

DESCRIPTIVE EPIDEMIOLOGIC METHODS

DesEpi 1: Identify, access, and integrate sources of health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions.

DesEpi 2: Explain the importance of epidemiology, and aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues (modification of C.3 and C.4).

DesEpi 3: Calculate and interpret basic descriptive epidemiology measures.
ETIOLOGIC, PROGNOSTIC, AND DIAGNOSTIC RESEARCH METHODS

RschEpi 1: Communicates the pathophysiology, natural history, and relative frequencies of health conditions that are major causes of morbidity and mortality

RschEpi 2: Calculate epidemiology measures of association and accuracy in prediction or diagnosis and draw appropriate inference from epidemiologic data

RschEpi 3: Compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies

RschEpi 4: Assess and implement strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias when drawing inference from epidemiologic studies

RschEpi 5: Discuss, from knowledge of the literature, the pathophysiology, natural history, and epidemiology in their chosen area of concentration (e.g., cardiovascular diseases, cancer, pediatric epidemiology, infectious diseases).

APPLIED BIOSTATISTICS

Core 1 Describe the roles biostatistics serves in the discipline of public health (A.1)

Core 2 Apply and interpret results from descriptive and inferential methodologies according to the type of study design, measurement scale, and available data for answering a particular research question (modification of A.4 and A.7)

Biostat 1: Use computer software for data entry and database management and use computer programs for summarizing, analyzing and displaying public health or biomedical research results (modification of A.8)

Biostat 2: Determine the most appropriate method of statistical analysis reflecting a given question of interest, the implemented study design and the available data, implementing preferred methodological alternatives to commonly used statistical methods when their assumptions are not met (modification of A.3 and A.7)

Biostat 3: Read the statistical methods reported in public health and medical literature and comment on their appropriateness to the study design and research questions (modification of A.9)

DISSEMINATION OF RESEARCH RESULTS

EComm 1: Demonstrate effective written and oral skills for communicating with different audiences in the context of professional public health or biomedical research activities
EComm 2: Design and implement a critical review of applied public health, biomedical, and epidemiological research literature related to a specific topic or question, critique the reported methods, and synthesize the findings

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**RESEARCH PROFESSIONAL PRACTICE**

Prof Epi: Become an integral team member, as a junior epidemiologist or research assistant, actively participating in identifying public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods to address the questions of interest

Prof Ethics: Demonstrate responsible conduct of research practices related to data acquisition and sharing, collaborative research, ethical research with human subjects, disclosure and management of conflicts of interest, avoidance of research misconduct, and responsible publication and authorship practices

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**d. Health Promotion Sciences MS**

HPS 1 Apply theories, concepts, and models from a range of social and behavioral disciplines that are used in public health research and practice (modification of E.1)

HPS 2 Analyze individual, organizational, and community concerns, assets, resources and deficits for social and behavioral science interventions (modification of E.3)

HPS 3 Apply ethical principles to public health program planning, implementation and evaluation (E.9)

HPS 4 Evaluate multiple targets and develop multiple levels of intervention for social and behavioral science programs and/or policies (modification of E.10)

HPS 5 Apply basic concepts and skills involved in culturally appropriate community engagement and empowerment with diverse communities (modification of G.5)

HPS 6 Demonstrate principles of community-based participatory research to improve health in diverse populations (modification of G.6)

HPS 7 Differentiate among goals, measurable objectives, related activities, and expected outcomes for a public health program (K.5)

HPS 8 Differentiate the purposes of formative, process, and outcome evaluation (K.6)
HPS MS 1  Understand and implement qualitative or quantitative research techniques including methodological conceptualization, technique selection, analysis types, limits of techniques, computer assisted coding, and selected techniques such as focus group research, social marketing, complex participant-observation, rapid appraisal methods, use of computer assisted statistical packages, and selected statistical methods such as, regression analysis, non-parametric methods, linear models, and analysis of multivariate data.

HPS MS 2  Apply knowledge of a significant public health problem in a substantive content area germane to research related to areas such as, minority, adolescent, aging, maternal and child, international, and gender health.

e. Industrial Hygiene/Environmental Health Sciences MS

IHGen A  Apply knowledge of mathematics, science, and applied sciences

IHGen B  Design and conduct experiments, as well as to analyze and interpret data

IHGen C  Formulate or design a system, process, or program to meet desired needs

IHGen D  Function on multi-disciplinary teams

IHGen E  Identify and solve applied science problems

IHGen F  Understand professional and ethical responsibility

IHGen G1  Communicate effectively in the field with people at all levels of an organization and with the public concerning health and safety

IHGen G2  Communicate effectively with professional peers

IHGen H  Demonstrate the broad education necessary to understand the impact of public health solutions in a global and societal context

IHGen I  Recognize the need for and ability to engage in life-long learning

IHGen J  Demonstrate knowledge of contemporary and historical issues regarding the health of populations with an understanding of the role of culture, power, privilege, and structural inequality in producing health disparities

IHGen L  Demonstrate understanding of the impact of solutions within an organization, based in part on field experience
IHSpec A Identify agents, factors, and stressors generated by and/or associated with defined sources, unit operations, and/or processes

IHSpec B Describe qualitative and quantitative aspects of generation of agents, factors, and stressors

IHSpec C Demonstrate understanding of physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body

IHSpec D Assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry

IHSpec E Calculate, interpret, and apply statistical and epidemiological data

IHSpec F Recommend and evaluate engineering, administrative, and personal protective equipment controls and/or other interventions to reduce or eliminate hazards

IHSpec G Understand applicable business and managerial practices, based in part on field experience

IHSpec H Interpret and apply applicable occupational and environmental regulations

IHSpec I Understand fundamental aspects of safety and environmental health

IHSpec J Attain recognized professional certification

V. Doctor of Philosophy (PhD) Program Competencies

a. Biostatistics PhD

STATISTICAL METHODS DEVELOPMENT

StatDev 1: Independently develop statistical research questions of interest concerning the properties of tests or estimators and the application of existing statistical methods in novel ways

StatDev 2: Develop new statistical methods

StatDev 3: Explain and derive the theoretical background of a broad class of statistical procedures including theoretical knowledge of the student’s doctoral research area of interest in biostatistical methods
STATISTICAL COMPUTING AND SIMULATION STUDY PROGRAMMING

Prog 1: Use computer software and/or programming languages for data simulation to evaluate the properties of statistical methods

Prog 2: Develop computer programs to process, summarize, analyze and display data from complex public health or biomedical data and research results in a wide range of software applications and computing environments including SAS, R, JMP, GIS tools, and/or WinBugs

TEACHING

Teach Biostat 1: Assist a faculty member in teaching graduate level courses in biostatistics by developing course material, delivering lectures, leading review and discussion sections, or writing and grading homework assignments and exams

Teach Biostat 2: Train others in the design of research studies and analysis of data, including students in the fields of biostatistics, epidemiology, public health, and biomedical sciences

RESEARCH PROGRAM DEVELOPMENT

RschPgm 1: Collaborate on interdisciplinary research teams by providing research design and data analysis support for research and evaluation projects

RschPgm 2: Identify and formulate public health or biomedical research questions, selecting appropriate study designs, identifying appropriate data collection and management methods, and selecting appropriate statistical analysis methods

RschPgm 3: Direct staff and student research team members who serve as research coordinators or data analysts

Prof Ethics: Demonstrate responsible conduct of research practices related to data acquisition and sharing, collaborative research, ethical research with human subjects, disclosure and management of conflicts of interest, avoidance of research misconduct, and responsible publication and authorship practices

APPLIED BIOSTATISTICAL METHODS

BMethod 1: Apply and interpret results from descriptive analyses according to the type of study design, measurement scale, and available data for answering a particular research question

BMethod 2: Utilize unbiased and efficient inferential methodologies, appropriate for the study design, measurement scale and available data, for estimation of parameters of interest

BMethod 3: For a broad range of complex studies, determine the most appropriate method of statistical analysis, reflecting a given question of interest, the implemented study design and the available data, implementing preferred methodological alternatives to commonly used statistical methods when their assumptions are not met
BMethod 4: Implement and interpret results from univariate, bivariate and multivariable procedures, acknowledging issues related to statistical power and overfitting available data, relative to the research study design and available data

BMethod 5: Critically evaluate the statistical methods reported in public health and medical literature, commenting on their appropriateness relative to the study design and research questions

EPIDEMIOLOGIC METHODS

EMethod1: Identify aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues

EMethod2: Accounting for complex sampling strategies, data measurement methods, and data completeness, analyze health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions

EMethod3: Calculate and interpret epidemiologic measures of disease burden, distribution, and association

EMethod4: Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies

EMethod5: Assess and implement strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias when drawing inference from epidemiologic studies

DISSEMINATION OF RESEARCH RESULTS

Com BP1: Design and implement a critical review of applied public health, biomedical, and statistical research literature in a specialty area, critique the reported methods, and synthesize the findings

Com BP2: Demonstrate effective written and oral skills for communicating with different audiences in the context of statistical methodology development, professional public health practice, or biomedical research activities

b. Epidemiology PhD

EPIDEMIOLOGIC RESEARCH PROGRAM DEVELOPMENT

EpiPgm1: Discuss, from knowledge of the literature, the pathophysiology, natural history, and epidemiology in their chosen area of concentration (e.g., cardiovascular diseases, cancer, pediatric epidemiology, infectious diseases).
EpiPgm2: Generate relevant epidemiological research questions that contribute new knowledge to the field

EpiPgm3: Independently design and implement epidemiologic studies to answer specific research questions using a variety of designs, interpret study results and relate findings to the relevant scientific literature

EpiPgm4: Direct and manage research staff and student assistants who are conducting project management, data collection and processing, and data analysis tasks

Prof Ethics: Demonstrate responsible conduct of research practices related to data acquisition and sharing, collaborative research, ethical research with human subjects, disclosure and management of conflicts of interest, avoidance of research misconduct, and responsible publication and authorship practices

COLLABORATIVE RESEARCH PROGRAM DEVELOPMENT

EpiCol1: Collaborate on interdisciplinary research teams and advocate for the importance of epidemiologic approaches to defining aspects of a public health problem in terms of magnitude, person, time and place, for informing scientific, ethical, economic and political discussion of health issues

EpiCol2: Become an integral team member actively participating in identifying public health or biomedical questions, selecting appropriate study designs, identifying appropriate data collection and measurement methods, and selecting appropriate statistical analysis methods to address the questions of interest while minimizing bias and measurement error or misclassification

ADVANCED EPIDEMIOLOGIC METHODS

Epi Meth1: Critically appraise and synthesize information related to the pathophysiology, natural history, and relative frequencies of health conditions that are major causes of morbidity and mortality

Epi Meth2: Calculate epidemiology measures and draw appropriate inference from epidemiologic data, utilizing advanced statistical methods that are appropriate for the given research design, measurement scale, population dynamics, and degree of measurement error or misclassification

Epi Meth3: Assess and implement strategies to summarize and report the impact of effect modification and to control for or minimize bias, including selection, information, and confounding bias when drawing inference from epidemiologic studies

Epi Meth4: Given an epidemiological investigation, compare and contrast strengths, limitations, and inference that may be drawn from data collected through the use of epidemiological research designs including cohort, case-control, ecologic, and cross-sectional studies
Epi Meth5: Accounting for complex sampling strategies, data measurement methods, and data completeness, analyze health data such as vital statistics records, disease registries, national surveys, and medical records in order to address epidemiologic questions

TEACHING EPIDEMIOLOGY

Teach Epi 1: Assist a faculty member in teaching graduate level courses in epidemiology by developing course material, delivering lectures, leading review and discussion sections, or writing and grading homework assignments and exams

Teach Epi 2: Train others in the design of research studies and analysis of data, including students in the fields of biostatistics, epidemiology, public health, and biomedical sciences

APPLIED BIOSTATISTICS METHODS

BMethod 1: Apply and interpret results from descriptive analyses according to the type of study design, measurement scale, and available data for answering a particular research question

BMethod 2: Utilize unbiased and efficient inferential methodologies, appropriate for the study design, measurement scale and available data, for estimation of parameters of interest

BMethod 4: Implement and interpret results from univariate, bivariate and multivariable procedures, acknowledging issues related to statistical power and overfitting available data, relative to the research study design and available data

DISSEMINATION OF RESEARCH RESULTS

Comm Epi P1: Design and implement a critical review of applied public health, biomedical, and epidemiological research literature in a specialty area, critique the reported methods, and synthesize the findings

Comm Epi P2: Demonstrate effective written and oral skills for communicating the objectives, design, implementation and results of epidemiologic investigations with different audiences in the context of professional public health practice or biomedical research activities

c. Health Promotion Sciences PhD

HPSDoc 1: Critique, apply, and advise upon the theoretical foundations of health promotion sciences from the perspective of all levels of the ecological model including individuals, small groups, communities, organizations, government, and social policy.
Apply the array of health promotion intervention strategies from the most current research, theoretical, methodological, and practice models, and contribute new strategies to the field.

Understand, implement, and advise upon qualitative research techniques including methodological conceptualization, technique selection, analysis types, limits of techniques, computer assisted coding, and selected techniques such as focus group research, social marketing, complex participant-observation, and rapid appraisal methods.

Understand, implement, and advise upon quantitative research techniques including methodological conceptualization, technique selection, analysis types, limits of techniques, use of computer assisted statistical packages, and selected statistical methods such as, regression analysis, non-parametric methods, linear models, and analysis of multivariate data.

Understand, implement, and advise upon program evaluation types and strategies, selection criteria for use of specific evaluation types, advanced principles of program evaluation implementation, and methods associated with each program evaluation type.

Apply and advise upon implementation of the principles of social and behavioral science disciplines relevant to public health, such as anthropology, communication, political science, psychology, sociology, and social work.

Contribute original research to the field that addresses significant public health problems.

d. Occupational and Environmental Health PhD

Exhaustively search and critically review the scientific literature in a chosen area of occupational and environmental health

Formulate testable scientific hypotheses

Design studies to test scientific hypotheses or otherwise produce meaningful findings

Use, and if appropriate, develop valid tools to collect and interpret data

Demonstrate understanding of the chosen area of specialization within occupational and environmental health
OEH D6  Recognize the limits of one’s own knowledge, and demonstrate the ability to seek and implement advice or collaboration as necessary

OEH D7  Understand the responsible conduct of research, including data acquisition, management, sharing and ownership; mentor/student responsibilities; publication practices and responsible authorship; peer review; collaborative science; research misconduct; conflict of interest, and protection of human subjects and of animals in research

OEH D8  Communicate research to scientific peers accurately and in a professional manner

OEH D9  Convey broad knowledge of occupational and environmental health in an educational setting