Competencies for all MPH Graduates of the ColoradoSPH	
Identifier	**CEPH Foundational Competencies**
Evidence-based Approaches to Public Health	
MPH 1	Apply epidemiological methods to settings and situations in public health practice
MPH 2	Select quantitative and qualitative data collection methods appropriate for a given public health context
MPH 3	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
MPH 4	Interpret results of data analysis for public health research, policy or practice
Public Health and Health Care Systems	
MPH 5	Compare the organization, structure, and function of health care, public health and regulatory systems across national and international settings
MPH 6	Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and systemic levels
Planning and Management to Promote Health	
MPH 7	Assess population needs, assets and capacities that affect communities' health
MPH 8	Apply awareness of cultural values and practices to the design, implementation, or critique of public health policies or programs
MPH 9	Design a population-based policy, program, project or intervention
MPH 10	Explain basic principles and tools of budget and resource management
MPH 11	Select methods to evaluate public health programs
Policy in Public Health	
MPH 12	Discuss the policy-making process, including the roles of ethics and evidence
MPH 13	Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
MPH 14	Advocate for political, social or economic policies and programs that will improve health in diverse populations
MPH 15	Evaluate policies for their impact on public health and health equity
Leadership	
MPH 16	Apply leadership and/or management principles to address a relevant issue
MPH 17	Apply negotiation and mediation skills to address organizational or community challenges
Communication	
MPH 18	Select communication strategies for different audiences and sectors
MPH 19	Communicate audience-appropriate (i.e. non-academic, non-peer audience) public health content, both in writing and through oral presentation
MPH 20	Describe the importance of cultural competence in communicating public health content
Interprofessional Practice	

MPH 21	Integrate perspectives from other sectors and/or professions to promote and advance population health
Systems Thinking	
MPH 22	Apply a systems thinking tool to visually represent a public health issue in a format other than standard narrative

Identifier	MPH Applied Biostatistics Concentration (BIOS) Competencies
MPH-BIOS 1	Translate a study's scientific question or aims into testable statistical hypotheses and propose and apply appropriate statistical methods to test those hypotheses.
MPH-BIOS 2	Fit and interpret models for continuous outcome data (normal linear model), categorical outcome data (logistic regression), and time-to-event data (Cox regression).
MPH-BIOS 3	Apply concepts of multiple regression, including confounding, statistical interactions, model selection, model fit, and regression diagnostics, in fitting and evaluating statistical models.
MPH-BIOS 4	Apply scientific and statistical principles of sampling, bias, confounding, and sample size estimation to design or interpret basic public health or biomedical studies.
MPH-BIOS 5	Use computer software for data management (data entry, access, and data manipulations), as well as for summarizing, analyzing and displaying research results
MPH-BIOS 6	Use the principles of hypothesis testing and estimation of population parameters to draw inferences from quantitative data and communicate orally and in writing those inferences and their statistical and scientific interpretation to non-statistical scientists.

Identifier	MPH Community and Behavioral Health Concentration (CBHS) Competencies
MPH-CBHS 1	Describe, select and apply appropriate theories, models, frameworks and evidence- based strategies for the development of health promotion, disease prevention, and disease management programs.
MPH-CBHS 2	Describe and apply systematic approaches and methods to assess the health-related needs of communities and populations, taking into account individual, interpersonal, community and societal factors.
MPH-CBHS 3	Utilize quantitative or qualitative data to identify disparities in health and inform the design and adaptation of culturally appropriate programs to promote health equity.
MPH-CBHS 4	Use systematic approaches to conceive, design, implement and evaluate health promotion and disease prevention programs/activities.
MPH-CBHS 5	Describe appropriate research designs and evaluation criteria to assess the effectiveness of public health programs.
MPH-CBHS 6	Critically assess and select appropriate quantitative and qualitative measurement methods for evaluating program reach, effectiveness, adoption, implementation, and sustainability.
MPH-CBHS 7	Effectively engage and collaborate with communities and stakeholders, in an equitable and ethical manner, including developing a work plan, communicating effectively and disseminating results.
MPH-CBHS 8	Analyze quantitative or qualitative data, using a social science perspective, to understand factors associated with health or health behavior.
MPH-CBHS 9	Interpret and report the results of quantitative or qualitative studies, taking a social science perspective on health.

Identifier	MPH Environmental and Occupational Health Concentration (EHOH) Competencies
MPH-EHOH 1	Apply appropriate monitoring methods to environmental and occupational health problems.
MPH-EHOH 2	Describe the movement of agents in the environment and the related risks for human disease as well the quality of air, water, and soil.
MPH-EHOH 3	Analyze important current environmental health problems and variations in health risks across the national or global landscape.
MPH-EHOH 4	Define the principles of resilience and apply these principles in the development of solutions to environmental or occupational health problems.
MPH-EHOH 5	Apply basic skills in geographic information systems (GIS) technology in the evaluation of environmental health problems.
MPH-EHOH 6	Apply theoretical frameworks or empirical evidence to inform or recommend interventions to improve the health, safety, or well-being of workers.
MPH-EHOH 7	Identify the uses of environmental measurements or biomarkers in evaluating exposures, health effects or susceptibility to environmental or occupational disease.
MPH-EHOH 8	Explain the scientific characteristics, such as exposure or mode of action, of major biological, chemical, or physical hazards that result in human health risk.
MPH-EHOH 9	Examine the policy framework that shapes environmental health at the federal, state or local levels and the historic and current decision-making processes that have shaped this framework.
MPH-EHOH 10	Describe historical and contemporary drivers of environmental or occupational health inequities.
MPH-EHOH 11	Recommend strategies to advance environmental justice.

Identifier	MPH Epidemiology Concentration (EPID) Competencies
MPH-EPID 1	Compare and prioritize public health issues within and across populations, using epidemiologic methods including measures of prevalence, incidence, morbidity, mortality, demographic characteristics and risk factors.
MPH-EPID 2	Critically review and evaluate public health and other scientific literature to identify threats to internal validity, strengths and weaknesses of individual studies, and assess for overall strength of evidence.
MPH-EPID 3	Synthesize evidence in a research area to identify gaps in evidence and to demonstrate relevance of current knowledge to the practice of public health.
MPH-EPID 4	Translate investigator ideas into answerable research questions.
MPH-EPID 5	Design studies to address public health topics, taking into account the strengths, limitations, and feasibility of study designs for addressing specific topics, as well as the practical aspects of their uses.
MPH-EPID 6	Describe best practices for design of data collection forms and protocols, instrument reliability and validity, data monitoring and quality assurance, and data archiving for analysis and use of data by other investigators.
MPH-EPID 7	Use computer software for data entry, database management, and summarizing, analyzing and displaying data.
MPH-EPID 8	Apply and interpret the concepts of effect modification, confounding, and bias in research design and analysis approaches.

Identifier	MPH Health Systems Management and Policy Concentration (HSMP) Competencies
Health Systems and Health Economics	
MPH-HSMP 1	Analyze the organization, financing and delivery of public and private health services in the U.S. and assess the effects of markets and political processes on these systems.
MPH-HSMP 2	Apply commonly used methods for evaluating health economic policy, including the use of cost-benefit and cost-effectiveness analysis
MPH-HSMP 3	Evaluate differences between models used for financing and delivering health care across countries.
Management and Leadership	
MPH-HSMP 4	Explain key elements of human resource management: defining roles and responsibilities; recruiting, motivating and retaining staffing; and assessing and applying measures for performance improvement.
MPH-HSMP 5	Apply common quality and performance improvement tools in public health and healthcare settings.
MPH-HSMP 6	Apply principles of budgeting and financial decision analysis in public health and healthcare settings.
MPH-HSMP 7	Examine attributes of strategic leadership, including the use of vision, mission, values, goals and objectives.
Policy	
MPH-HSMP 8	Differentiate key public health laws, regulations, and policies affecting health programs and the delivery of health services
MPH-HSMP 9	Investigate commonly used frameworks for systematically and critically evaluating the policy development and implementation process at the federal, state, and local levels and outside the U.S.
MPH-HSMP 10	Develop a plan for engaging stakeholders and building coalitions in the development or implementation of health policy.
MPH-HSMP 11	Examine how ethical considerations (such as social justice and human rights) influence health policy.
MPH HSMP 12	Analyze how organization and delivery of health care in the U.S. relates to health equity.

Identifier	MPH Global Health Plus Concentration (GLH) Competencies
MPH-GLH 1	Describe contemporary and historic global health issues, programs, best practices, and players.
MPH-GLH 2	Critically analyze the political, economic, and ethical issues relevant to methods and contemporary issues in global health.
MPH-GLH 3	Recommend data collection methods in a global context, taking into account unique resource and cultural aspects of the geographic setting.
MPH-GLH 4	Apply concepts of global burden of disease, especially disability-adjusted life years, across national and international settings to address health challenges.
MPH-GLH 5	Describe the geographic differences and connections between regions around the world and how they affect health.

Identifier	MPH Leadership and Public Health Practice Concentration (LPHP) Competencies
MPH-LPHP 1	Interpret and develop an implementation plan for public health laws, regulations and policies
MPH-LPHP 2	Articulate a personal development plan, including an achievable mission, set of core values and vision and use these to guide personal and professional action.
MPH-LPHP 3	Identify issues, internal and external to an organization, that may impact delivery of essential public health services.
MPH-LPHP 4	Facilitate collaborative decision-making by listening to others in an unbiased manner, respecting points of view of others and promoting the expression of diverse opinions and perspectives.
MPH-LPHP 5	Develop mechanisms to monitor and evaluate programs for their effectiveness and quality.
MPH-LPHP 6	Apply the principles of program planning, development, implementation, budgeting, management and evaluation to organizational or community initiatives.
MPH-LPHP 7	Create a feasible and theoretically-grounded issue action plan to solve or alleviate a public health concern defined by community stakeholders.

Identifier	MPH Maternal and Child Health Concentration (MCH) Competencies
MPH-MCH 1	Describe maternal and child health problems in terms of time, magnitude, scope, location, co-occurrence and co-morbidity.
MPH-MCH 2	Assess demographic, health, familial, socio-cultural, environmental, and community factors and apply to the design of maternal and child health programs and services.
MPH-MCH 3	Select and interpret existing data sources including vital statistics, censuses, surveys and/or service utilization records to make meaningful inferences about the health of maternal and child health populations.
MPH-MCH 4	Interpret and appropriately use data to identify problems and assets and to plan, implement, and evaluate maternal and child health programs.
MPH-MCH 5	Select, use, and interpret maternal and child health performance measures to evaluate programs and service networks for their effectiveness and quality.
MPH-MCH 6	Describe significant past and current national maternal and child health practices, programs, and relevant legislation and apply to the development and delivery of maternal and child health services.
MPH-MCH 7	Apply lifecourse and other relevant theories to maternal and child health policy development and implementation.

Identifier	MPH Population Mental Health and Wellbeing Concentration (PMHW) Competencies
MPH-PMHW 1	Describe natural history, prevalence rates, risk and protective factors, prevention/treatment strategies of major mental health and substance use disorders
MPH- PMHW 2	Critically evaluate the evidence to support theoretical constructs of well-being in the promotion of mental health and prevention of substance use.
MPH- PMHW 3	Recommend interventions to enhance well-being and prevent mental health and substance use disorders at the population level.
MPH- PMHW 4	Analyze the relationship between policies and integrated healthcare systems related to behavioral health.
MPH- PMHW 5	Describe methods for research and evaluation of behavioral health programs.
MPH- PMHW 6	Analyze the social, cultural, interpersonal, and personal factors that uniquely relate to mental health and substance use disorders and their public health implications.

Identifier	MPH Community Health Education Concentration (CHE) Competencies
MPH-CHE 1	Examine the accessibility of community health resources and services from a health equity lens and analyze how access impacts individual and community health.
MPH-CHE 2	Explain how cultural beliefs and practices both positively and negatively influence participation in community health initiatives.
MPH-CHE 3	Synthesize knowledge of community health education and public health to illustrate best practices for effective community engagement.
MPH-CHE 4	Apply public health theoretical concepts or models to create a community health initiative that includes a logic model for aligning the mission, goals and measurable process, outcome and impact objectives of the initiative.
MPH-CHE 5	Apply cultural theories and frameworks when working with community groups/stakeholders on a community-engaged initiative.

Identifier	MPH Animals People and Environment Concentration (APE) Competencies
MPH-APE 1	Assess the public health threat of emerging issues to animal and human populations and identify intervention strategies.
MPH-APE 2	Analyze how social, political and cultural differences can impact public perceptions about how human, environment and animal interactions affect public health, social well-being and environmental health.
MPH-APE 3	Identify ways in which agricultural and human incursion positively and adversely impact environmental and ecological health, and develop methods of minimizing negative impacts
MPH-APE 4	Develop strategies for optimal communication and collaboration between human, animal, and health professionals
MPH-APE 5	Incorporate the principles of safe and secure food systems into public health problem solving.

Identifier	MPH Epidemiology Concentration (EPID) Competencies - CSU
MPH-EPID 1	Compare and prioritize public health issues within and across populations, using epidemiologic methods including measures of prevalence, incidence, morbidity, mortality, demographic characteristics and risk factors.
MPH-EPID 2	Critically review and evaluate public health and other scientific literature to identify threats to internal validity, strengths and weaknesses of individual studies, and assess for overall strength of evidence.
MPH-EPID 3	Synthesize evidence in a research area to identify gaps in evidence and to demonstrate relevance of current knowledge to the practice of public health.
MPH-EPID 4	Translate investigator ideas into answerable research questions.
MPH-EPID 5	Design studies to address public health topics, taking into account the strengths, limitations, and feasibility of study designs for addressing specific topics, as well as the practical aspects of their uses.
MPH-EPID 6	Describe best practices for design of data collection forms and protocols, instrument reliability and validity, data monitoring and quality assurance, and data archiving for analysis and use of data by other investigators.
MPH-EPID 7	Use computer software for data entry, database management, and summarizing, analyzing and displaying data.
MPH-EPID 8	Apply and interpret the concepts of effect modification, confounding, and bias in research design and analysis approaches.

Identifier	MPH Global Health and Health Disparities Concentration (GHHD) Competencies
MPH-GHHD 1	Use a population pyramid to assess the role of demographic characteristics in shaping patterns of morbidity, mortality, and health service needs of a specified community, country, or region.
MPH-GHHD 2	Describe the roles and relationships of the entities (such as NGOs, national governmental agencies, and international organizations) influencing global health and health disparities.
MPH-GHHD 3	Propose strategies to engage marginalized and vulnerable populations in making decisions that affect their health and well-being.
MPH-GHHD 4	Conduct a situation analysis across a range of cultural, economic, and health contexts.
MPH-GHHD 5	Design context-specific health interventions based upon a situation analysis.

Identifier	MPH Health Communication Concentration (HCOM) Competencies
MPH-HCOM 1	Apply theory and strategy-based communication principles across different settings for public health practice.
MPH-HCOM 2	Design a communication-based public health intervention applying best practices of message production and delivery for a target audience.
MPH-HCOM 3	Identify and analyze fundamental properties of the intended audience, including demographic, psychological, sociological and cultural elements, for a communication-based intervention at all levels from interpersonal to mass.
MPH-HCOM 4	Assess the critical relationship between formative and evaluative research in the ongoing delivery of a communication-based intervention.
MPH-HCOM 5	Develop a communication plan to reach relevant professional groups, the public, and policy-makers.

Identifier	MPH Physical Activity and Healthy Lifestyles Concentration (PAHL) Competencies
MPH-PAHL 1	Use public health data to assess the healthy lifestyle needs of a population and prioritize community-based interventions aimed at promoting physical activity or other healthy lifestyle behaviors.
MPH-PAHL 2	Utilize field-specific assessment tools to measure physical activity and healthy lifestyle behaviors as well as their supports and barriers.
MPH-PAHL 3	Apply nationally-recognized, evidence-based physical activity promotion approaches to the implementation and evaluation of community health promotion programs.
MPH-PAHL 4	Identify and analyze historic and current trends, guidelines, recommendations, and research in the field of physical activity.
MPH-PAHL 5	Develop strategies to engage with external partners from a variety of disciplines, including transportation and city planning, to promote physical activity or healthy lifestyles.
MPH-PAHL 6	Describe the effects of physical activity on primary, secondary and tertiary prevention of various chronic diseases such as heart disease, stroke, diabetes mellitus, cancer, arthritis, asthma, osteoporosis or obesity.
MPH-PAHL 7	Incorporate a variety of approaches for physical activity or healthy lifestyle promotion programs that anticipate and respect diverse values, beliefs, and cultures in the community.

Identifier	MPH Public Health Nutrition Concentration (PHNU) Competencies
MPH-PHNU 1	Appraise essential dietary macronutrients (carbohydrates, lipids, proteins) for their optimal sources and contribution to cellular and organ function that sustain human health and well-being.
MPH-PHNU 2	Appraise essential dietary micronutrients (vitamins and minerals) for their optimal sources and contribution to cellular and organ function that sustain human health and well-being.
MPH-PHNU 3	Analyze the effects of different dietary patterns on the primary, secondary and tertiary prevention of various chronic diseases such as obesity, diabetes, coronary heart disease, cancer and others.
MPH-PHNU 4	Analyze and interpret nutritional data using epidemiological principles to assess chronic disease outcomes.
MPH-PHNU 5	Assess dietary intake using nutrition assessment tools and apply evidence-based approaches to best measure dietary exposures and chronic disease outcomes in population.
MPH-PHNU 6	Apply evidence-based public health planning strategies to design nutrition programs.
MPH-PHNU 7	Apply evidence-based public health evaluation strategies to assess effectiveness of nutrition programs.

Identifier	Core (CR) DrPH Competencies
Data & Analysis	
DrPH 1	Explain qualitative, quantitative, mixed methods and policy analysis research and evaluation methods to address health issues at multiple (individual, group, organization, community and population) levels
DrPH 2	Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue
DrPH 3	Explain the use and limitations of surveillance systems and national surveys in assessing, monitoring and evaluating policies and programs and to address a population's health
Leadership, Management & Governance	
DrPH 4	Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders and other partners
DrPH 5	Communicate public health science to diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies
DrPH 6	Integrate knowledge, approaches, methods, values and potential contributions from multiple professions, sectors and systems in addressing public health problems
DrPH 7	Create a strategic plan
DrPH 8	Facilitate shared decision making through negotiation and consensus-building methods
DrPH 9	Create organizational change strategies
DrPH 10	Propose strategies to promote inclusion and equity within public health programs, policies and systems
DrPH 11	Assess one's own strengths and weaknesses in leadership capacities, including cultural proficiency
DrPH 12	Propose human, fiscal and other resources to achieve a strategic goal
DrPH 13	Cultivate new resources and revenue streams to achieve a strategic goal
Policy & Programs	
DrPH 14	Design a system-level intervention to address a public health issue
DrPH 15	Integrate knowledge of cultural values and practices in the design of public health policies and programs
DrPH 16	Integrate scientific information, legal and regulatory approaches, ethical frameworks and varied stakeholder interests in policy development and analysis
DrPH 17	Propose interprofessional and/or intersectoral team approaches to improving public health
Education & Workforce Development	

DrPH 18	Assess an audience's knowledge and learning needs
DrPH 19	Deliver training or educational experiences that promote learning in academic, organizational or community settings
DrPH 20	Use best practice modalities in pedagogical practices

Identifier	DrPH Community and Behavioral Health Focus Area (FA) Competencies
DrPH-CBHS 1	Synthesize health behavior theories, models, frameworks and evidence-based integrative strategies at multiple levels of the socio-ecological model to develop theory-informed conceptual models
DrPH-CBHS 2	Apply advanced statistical methods used in social sciences, such as multilevel modeling or latent variable methods
DrPH-CBHS 3	Collect and analyze qualitative data to inform a public health issue
DrPH-CBHS 4	Design a research study that is responsive to community needs and answers a public health research question
DrPH-CBHS 5	Demonstrate an in-depth knowledge in the candidate's chosen substantive interest area in behavioral/social science related to public health
DrPH-CBHS 6	Develop a grant proposal to address a public health problem
DrPH-CBHS 7	Integrate principles of design for dissemination into the development of a public health intervention

Identifier	DrPH Environmental & Occupational Health Focus Area (FA) Competencies
DrPH-EHOH 1	Critically evaluate toxicological and epidemiological data and explain its role in informing risk-based decision making
DrPH-EHOH 2	Describe local, regional and/or global impact of an environmental hazard on human and ecological health, and design an appropriate study to evaluate risks associated with this hazar
DrPH-EHOH 3	Evaluate contemporary environmental and occupational health issues using geographic, epidemiologic, or other data collection methods as appropriate
DrPH-EHOH 4	Create a data collection and management plan for an environmental or occupational health research study
DrPH-EHOH 5	Identify and critically evaluate secondary data sources appropriate for answering applied research and program evaluation questions in environmental and occupational health
DrPH-EHOH 6	Develop grant proposals to conduct research to test well-conceived hypotheses and/or evaluation studies to assess impact

Identifier	DrPH Epidemiology Focus Area (FA) Competencies
DrPH-EPID 1	Critically evaluate epidemiological study designs and describe the advantages and limitations of each for addressing specific problems and recommend design modifications to strengthen validity
DrPH-EPID 2	Apply basic ethical and legal principles involved in the collection, management, use and dissemination of epidemiologic data in research and public health practice
DrPH-EPID 3	Select and apply appropriate research design and analysis methods when using secondary data sources, such as surveillance, national surveys, and medical record data, to answer epidemiologic questions
DrPH-EPID 4	Demonstrate mastery of a substantive area in epidemiology, including the application of that knowledge in conducting research and implementing programs related to a specific epidemiologic question
DrPH-EPID 5	Calculate and interpret measures of disease frequency and association to draw appropriate inferences and evaluate causality
DrPH-EPID 6	Develop a grant proposal to address a public health problem

Identifier	MS Biostatistics Competencies
MS-BIOS 1	Carry out and explain calculations, derivations and proofs central to basic statistical theory, and explain their use and implications in applied statistical work.
MS-BIOS 2	Apply statistical concepts of basic study designs including bias, confounding and efficiency, and identify strengths and weaknesses of experimental and observational designs.
MS-BIOS 3	Carry out exploratory and descriptive analyses of complex data using standard statistical software and methods of data summary and visualization.
MS-BIOS 4	Carry out valid and efficient modeling, estimation, model checking and inference using standard statistical methods and software.
MS-BIOS 5	Demonstrate statistical programming proficiency, good coding style and use of reproducible research principles using leading statistical software.
MS-BIOS 6	Demonstrate basic skills necessary for collaborating with non-biostatistical scientists, including mapping study aims to testable hypotheses, carrying out basic power and sample size estimation and evaluation, and identifying appropriate design, modeling and analysis methods to address study hypotheses.
MS-BIOS 7	Communicate, orally and in writing, simple and complex statistical ideas, methods and results in non-technical terms appropriate for collaborator needs (e.g. preparation of analysis section of grant proposals and methods and results sections of manuscripts).

Identifier	MS Epidemiology Competencies
MS-EPID 1	Formulate sound scientific research questions.
MS-EPID 2	Synthesize a body of evidence from the scientific literature and identify areas of need for future investigation.
MS-EPID 3	Select and apply appropriate study design, data collection and analysis methods to address research or public health topics.
MS-EPID 4	Utilize secondary data sources to answer a given research or public health question, considering limitations, study design and analytic solutions.
MS-EPID 5	Critically appraise research and public health studies for internal and external validity, with consideration of how these issues influence interpretation of study findings.
MS-EPID 6	Anticipate types of biases that may occur in research and public health studies and determine strategies to prevent or minimize these.
MS-EPID 7	Calculate and interpret measures of disease frequency and association measures to draw appropriate inferences and evaluate causality.
MS-EPID 8	Describe and apply basic ethical and legal principles involved in the collection, management, use and dissemination of epidemiologic data.
MS-EPID 9	Interact effectively within a multidisciplinary team for the purpose of addressing a research question.

Identifier	MS Health Services Research Competencies
MS-HSR 1	Identify the main components and issues of the organization, financing, and delivery of health services and public health systems in the U.S.
MS-HSR 2	Identify, and measure, clinically meaningful and/or policy relevant outcomes and apply evidence-based practice principles.
MS-HSR 3	Critically appraise existing literature and evaluate manuscripts published in peer-reviewed journals
MS-HSR 4	Demonstrate breadth of health services research theoretical and conceptual knowledge by applying alternative organizational and behavioral models from a range of relevant disciplines.
MS-HSR 5	Pose innovative and important health service research questions, informed by systematic reviews of the literature, stakeholder needs, and relevant theoretical and conceptual models.
MS-HSR 6	Select the appropriate econometric/statistical specification and estimation technique, including using specification tests and theoretical justifications for distributional assumptions, the choice of link function, and estimation approach for a variety of outcomes
MS-HSR 7	Choose and define the appropriate unit of analysis and approach to computing standard errors for conducting hypothesis test.
MS-HSR 8	Understand and apply methods for causal inference and identify the assumptions that may or may not hold for a causal interpretation.
MS-HSR 9	Write and know how to submit grant proposals to federal, state, and non-governmental organizations.
MS-HSR 10	Describe legal, ethical and regulatory issues related to clinical research.
MS-HSR 11	Demonstrate the ability to effectively communicate the findings and implications of health service research findings to technical and lay audiences
MS-HSR 12	Design and conduct research studies using health services research methods.
MS-HSR 13	Discuss the policy process for improving the health status of populations.

Identifier	PhD Biostatistics Competencies
PHD-BIOS 1	Carry out and explain calculations, derivations and proofs central to basic statistical theory, and explain their use and implications in applied statistical work.
PHD-BIOS 2	Apply statistical concepts of basic study designs including bias, confounding and efficiency, and identify strengths and weaknesses of experimental and observational designs.
PHD-BIOS 3	Carry out exploratory and descriptive analyses of complex data using standard statistical software and methods of data summary and visualization.
PHD-BIOS 4	Carry out valid and efficient modeling, estimation, model checking and inference using standard statistical methods and software.
PHD-BIOS 5	Demonstrate statistical programming proficiency, good coding style and use of reproducible research principles using leading statistical software.
PHD-BIOS 6	Demonstrate basic skills necessary for collaborating with non-biostatistical scientists, including mapping study aims to testable hypotheses, carrying out basic power and sample size estimation and evaluation, and identifying appropriate design, modeling and analysis methods to address study hypotheses.
PHD-BIOS 7	Communicate, orally and in writing, simple and complex statistical ideas, methods and results in non-technical terms appropriate for collaborator needs (e.g. preparation of analysis section of grant proposals and methods and results sections of manuscripts).
PHD-BIOS 8	Carry out and explain calculations, derivations and proofs central to advanced statistical theory, and explain their use and implications in applied statistical work.
PHD-BIOS 9	Carry out advanced statistical modeling using a range of statistical theory, methods and computation.
PHD-BIOS 10	Demonstrate advanced collaborative biostatistical skills, including formulating testable study aims, identifying, designing and evaluating statistical analyses appropriate for study aims, reading and synthesizing biostatistical literature relevant to study analyses, and suggesting new methods when existing approaches are inadequate.
PHD-BIOS 11	Carry out independent biostatistical research involving development and evaluation of novel statistical methods and their application to problems of importance in health science research, and report the methods and findings orally and in writing (e.g., a dissertation and publishable papers).

Identifier	PhD Epidemiology Competencies
PHD-EPID 1	Formulate sound scientific research questions and transform them into a research protocol and analysis plan.
PHD-EPID 2	Critically review the scientific literature in order to appraise the methodologic quality of individual studies, qualitatively or quantitatively synthesize a body of evidence and identify areas of need for future investigation.
PHD-EPID 3	Select and apply appropriate study design, data collection and analysis methods to address research or public health topics.
PHD-EPID 4	Utilize a variety of data sources to address a given research or public health question; considering limitations, study design and analytic solutions.
PHD-EPID 5	Interpret measures of disease burden associated with an exposure to determine the most impactful clinical or public health interventions.
PHD-EPID 6	Critically appraise research and public health studies for internal and external validity, with consideration of how these issues influence interpretation of study findings.
PHD-EPID 7	Anticipate types of biases that may occur in research and public health studies and determine strategies to prevent or minimize these.
PHD-EPID 8	Calculate and interpret measures of disease frequency and association measures to draw appropriate inferences and evaluate causality.
PHD-EPID 9	Develop statistical models appropriate to specific study designs, distinguishing between predictive, associative, and causality-based analytic approaches
PHD-EPID 10	Carry out appropriate power or precision calculations to ensure that sample size is sufficient to achieve the scientific aims or address a specific research hypothesis.
PHD-EPID 11	Understand and apply nuanced ethical and legal principles involved in the collection, management, use and dissemination of epidemiologic data.
PHD-EPID 12	Communicate both orally and in writing to make persuasive arguments for non-statistical scientists, practitioners and community members.
PHD-EPID 13	Demonstrate expertise to lead a multidisciplinary research team or collaboration.

Identifier	PhD Health Service Research Competencies
PHD-HSR 1	Identify the main components and issues of the organization, financing, and delivery of health services and public health systems in the U.S.
PHD-HSR 2	Identify and measure clinically meaningful and/or policy relevant outcomes and apply evidence-based practice principles.
PHD-HSR 3	Critically appraise existing literature and evaluate manuscripts published in peer-reviewed journals
PHD-HSR 4	Demonstrate breadth of health services research theoretical and conceptual knowledge by applying alternative organizational and behavioral models from a range of relevant disciplines.
PHD-HSR 5	Pose innovative and important health service research questions, informed by systematic reviews of the literature, stakeholder needs, and relevant theoretical and conceptual models.
PHD-HSR 6	Select the appropriate econometric/statistical specification and estimation technique, including using specification tests and theoretical justifications for distributional assumptions, the choice of link function, and estimation approach for a variety of outcomes
PHD-HSR 7	Choose and define the appropriate unit of analysis and approach to computing standard errors for conducting hypothesis test.
PHD-HSR 8	Understand and apply methods for causal inference and identify the assumptions that may or may not hold for a causal interpretation.
PHD-HSR 9	Write and know how to submit grant proposals to federal, state, and non-governmental organizations.
PHD-HSR 10	Describe and adhere to legal, ethical and regulatory issues related to clinical research.
PHD-HSR 11	Demonstrate the ability to effectively communicate the findings and implications of health service research through multiple modalities to an interdisciplinary audience.
PHD-HSR 12	Independently design, conduct, and defend research studies using health services research methods.
PHD-HSR 13	Participate in interdisciplinary collaboration, provide constructive reviews and feedback to colleagues, and demonstrate leadership in the appropriate application of health services research methods.