

EPIDEMIOLOGY, MHS

Master of Health Science Degree Programs

Ideal for individuals with strong science and mathematics skills who may or may not have research experience, the MHS in Epidemiology (<https://publichealth.jhu.edu/academics/mhs-dept-of-epidemiology/>) is a two-year, intensive academic degree program that focuses on applying epidemiological and biostatistical methods to a variety of current public health issues. Successful applicants are motivated to use advanced quantitative methods to analyze public health information and to use a translational approach to communicate results. Students select and specialize in one of the research tracks listed below and complete at least 64 credit units in epidemiology, biostatistics, and elective courses, pass a written comprehensive exam, produce a high-quality thesis, and present their research during the annual poster symposium. Graduates from the MHS go on to positions in research coordination, government and policy work, consulting or pharmaceutical research, or pursue doctoral degrees after some years of work experience in a variety of fields.

<https://publichealth.jhu.edu/departments/epidemiology/programs/>
(<https://publichealth.jhu.edu/departments/epidemiology/programs/>)

Bachelor's/MHS

The Bachelor's/MHS degree is designed for undergraduate students pursuing a BA or BS at Johns Hopkins University Krieger School of Arts and Sciences who are majoring in Public Health Studies (<https://krieger.jhu.edu/publichealth/academics/bamasters-program/>) and who are interested in pursuing an advanced degree at BSPH. The program prepares students for further graduate work or prominent careers in research and science. The benefit of the Bachelor's/MHS is that it allows Johns Hopkins University undergraduates (only) to take BSPH courses during their undergraduate program and apply up to 16 credits accumulated as undergraduates into the MHS program. Students who complete the undergraduate degree at JHU enroll as MHS candidates and follow the MHS program, with a compressed version of the master's degree encouraged.

Academic Advising

Master's students are each assigned a group academic adviser for the first three terms of the program. The Group Adviser serves as the academic adviser and meets with a group of advisees regularly to discuss academic issues, progress, development, and goals in the degree program. During the third term, the track directors, with input from the students and faculty, assign students to a thesis adviser in their research field. The thesis adviser may be a faculty member with a primary or joint appointment in the Department of Epidemiology. If the thesis adviser has a joint appointment in the Department, a faculty member with a primary appointment in the department must co-advise with the thesis adviser, and serve as the primary adviser of record.

All Master's students are required to meet with their thesis advisers regularly. Students should work with their thesis advisers to develop a timeline for completing their thesis research by the required deadlines. Students are expected to begin thesis research in the summer after their first year but may not commence research until they have passed the written comprehensive exam.

Academic Year 2023-24 (Applies to MA, MAS, MHA, MHS, MS, and MSPH)

Due Dates for Summer Conferral (August 25, 2023)

JUNE 9, 2023

- Special Project, Scholarly Report, Paper, or Thesis has been submitted to the Department Chair or Adviser

August 25, 2023

- Department Chair has:
 - Indicated in writing to the Office of Records and Registration (BSPH_Graduation@jhu.edu (bsph.admission@jhu.edu)) that all degree requirements have been fulfilled
 - Certified the student's eligibility for award of degree

Due Dates for Fall Conferral (December 29, 2023)

October 20, 2023

- Special Project, Scholarly Report, Paper, or Thesis has been submitted to the Department Chair or Adviser

December 15, 2023

- Department Chair has:
 - Indicated in writing to the Office of Records and Registration (BSPH_Graduation@jhu.edu) that all degree requirements have been fulfilled
 - Certified the student's eligibility for award of degree

Due Dates for Spring Conferral (May 23, 2024)

April 5, 2024

- Special Project, Scholarly Report, Paper, or Thesis has been submitted to the Department Chair or Adviser

May 3, 2024

- Department Chair has:
 - Indicated in writing to the Office of Records and Registration (BSPH_Graduation@jhu.edu) that all degree requirements have been fulfilled
 - Certified the student's eligibility for award of degree

Degree Program Requirements

Course location and modality is found on the BSPH website (<https://www.jhsph.edu/courses/>).

Non-Class Requirements

TRACK-SPECIFIC ACTIVITIES MASTER'S

Each Track holds journal clubs, research-in-progress meetings, and other activities, that those Track students are expected to attend. These activities are opportunities to engage and interact with Track faculty, fellow students, and post-doctoral fellows, and to participate and present in the topic area of the Track. All master's students are expected to participate in their track activities.

QUARTERLY MASTER'S MEETINGS

The Master's Program Co-Directors host quarterly meetings with all of the first and second-year Master's students. These meetings provide a forum to learn about academic policies and deadlines, for students to raise questions and concerns, and for all to hear the answers. All Master's students are expected to attend.

Core Coursework (Required for All Epidemiology MHS and Bachelor's/MHS Students)

The Master's Level Core Requirements are listed by year and term for all Epidemiology Master of Health Science students. To broaden perspective and to enhance the student's capabilities for work in public health or disease-related fields, at least 12 credits of coursework are required in courses from at least one department outside the student's primary department. At least 6 of these credits must be taken in BSPH. Full-time students register for a minimum of 16 credits and a maximum of 22 credits each term. Master's degree-seeking students must complete the core-required courses for a letter grade earning a B or better in each course. The overall minimum grade point average is 2.75 for master's students.

Residency/Registration Requirement

A minimum of 64 credits is required to complete the MHS degree programs. The residency requirement is four consecutive terms of at least 16 credits each. Residency must be completed during the first year of the program.

Cells to Society Courses [CEPH Core Requirements]

A full list of courses and term offerings is located online (<https://www.jhsph.edu/course-directory/cells-to-society-courses.html>). Epidemiology degree students are required to complete these 8 of the 12 sessions. Each course is 0.5 credits and is offered only online. Many of these courses can be used as introductions to full-term courses offered in multiple modalities throughout the year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

REQUIRED CORE COURSEWORK (subject to change)

Course	Title	Credits
First Year		
First Term		
Summer Before Year 1		
Online Incoming Epi Students 2020 Orientation includes:		
Introduction to Online Learning		
Sexual Harassment and Sexual Violence Prevention Training (Title IX)		
Unconscious Bias Training		
First Term		
PH.140.621 or PH.140.651	Statistical Methods in Public Health I or Methods in Biostatistics I	4
PH.340.751	Epidemiologic Methods 1	5

PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		6

Credits 16

Second Term

PH.140.622 or PH.140.652	Statistical Methods in Public Health II or Methods in Biostatistics II	4
PH.340.752	Epidemiologic Methods 2	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.550.865	Public Health Perspectives on Research ¹	2
Select recommended and elective courses to total 16 credits per term		4

Credits 16

Third Term

PH.140.623	Statistical Methods in Public Health III	4
PH.140.653	Methods in Biostatistics III	4
PH.340.753	Epidemiologic Methods 3	5
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		2

Credits 16

Fourth Term

PH.140.624 or PH.140.654	Statistical Methods in Public Health IV or Methods in Biostatistics IV	4
PH.340.723	Epidemiologic Practice Methods for Population Health Research	2
PH.340.820	Thesis Research Epidemiology (varies)	1 - 3
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		8

Department Comprehensive Examination

Pass Parts A&B - immediately following Fourth Term

Credits 16-18

Second Year

First Term

PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
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Credits 1-22

Second Term

PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
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Credits 1-22

Third Term

PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
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Credits 1-22

Fourth Term

PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
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Credits 1-22

Total Credits 68-154

¹ May be waived if student holds MPH from a CEPH accredited program in past 10 yrs

COURSES THAT MEET THE "OUTSIDE TRACK REQUIREMENT"

All students must complete one introductory topical epidemiology course outside of the chosen track. Choices below:

Code	Title	Credits
Select one of the following:		
PH.340.616	Epidemiology of Aging (Term 1)	3-4
PH.340.731	Principles of Genetic Epidemiology 1 (Term 1)	
PH.340.682	Pharmacoepidemiology Methods (Term 2)	
PH.330.603	Psychiatric Epidemiology (Term 2)	
PH.340.624	Etiology, Prevention, and Control of Cancer (Term 2)	
PH.340.627	Epidemiology of Infectious Diseases (Term 2)	
PH.340.645	Introduction to Clinical Trials (Term 2)	
PH.340.699	Epidemiology of Sensory Loss in Aging (Term 3)	
PH.340.607	Introduction to Cardiovascular Disease Epidemiology (Term 3)	
PH.340.680	Environmental and Occupational Epidemiology (Term 4)	
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	
PH.340.666	Foundations of Social Epidemiology (Term 4)	
Total Credits		3-4

DEPARTMENT-WIDE RECOMMENDED COURSES

Code	Title	Credits
PH.340.860	Current Topics in Epidemiologic Research (Term 1-4, credits variable) ²	1
PH.340.770	Public Health Surveillance (Term 2)	3
PH.340.769	Professional Epidemiology Methods (Term 3)	4
PH.340.840	Special Studies and Research Epidemiology (Term 1-4, credits variable) ¹	1-8

¹ 1 term, can be taken in any term 1 through 4

² Recommended for all four terms during year 2

Track Course Requirements (subject to change - notices will be sent to current students)

Each track requires additional coursework as below and the course content is covered on the annual Comprehensive Exams.

Cancer Epidemiology

Courses Required for Master's Students in Cancer Epidemiology First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1

Term 2: PH.340.732 Principles of Genetic Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer

Second Year

Term 1: ME.510.706 Fundamentals of Cancer: Cause to Cure or PH.120.624 Cancer Biology

Term 2: ME.510.706 Fundamentals of Cancer: Cause to Cure or PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health

Recommended courses for Master's Students in Cancer Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.340.616 Epidemiology of Aging 3 cr
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3 cr

PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5 cr

Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4 cr

PH.140.630 Introduction to Data Management 3 cr

PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners 3 cr

PH.330.603 Psychiatric Epidemiology 3 cr

PH.340.645 Introduction to Clinical Trials 3 cr

PH.340.666 Foundations of Social Epidemiology* 3 cr (alt yrs offered 4th term)

PH.340.682 Pharmacoepidemiology Methods 3 cr* alternates

every other year online (4) and in-person (2)

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4 cr

PH.340.694 Power and Sample Size for the Design of

Epidemiological Studies I 1 cr

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3 cr

PH.340.680 Environmental and Occupational Epidemiology 4 cr

PH.120.624 Cancer Biology 3 cr

PH.380.664 Reproductive and Perinatal Epidemiology 4 cr

Cardiovascular and Clinical Epidemiology

Courses Required for master's students in Cardiovascular and Clinical Epidemiology

Required Courses for Students focusing in Cardiovascular Epidemiology First Year

(Students WITHOUT a background in biology or medicine: PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) OR PH.550.630 Public Health Biology

AND PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology

AND PH.340.730 Assessment of Clinical Cardiovascular Disease (alternate years 3rd term))

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.607 Introduction to Cardiovascular Disease Epidemiology

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Required Courses for Students focusing in Clinical Epidemiology First Year

(Students WITHOUT a background in biology or medicine:)

PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) **OR** PH.550.630 Public Health Biology

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials
PH.340.620 Principles of Clinical Epidemiology

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Recommended courses for Master's Students in Cardiovascular and Clinical Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Course number / Course Name / Credits

Term 1: PH.340.687 Epidemiology of Kidney Disease 2

PH.340.731 Principles of Genetic Epidemiology 1 4

PH.340.616 Epidemiology of Aging 3 (alternates online and in-person every other year)

Term 2: PH.340.624 Etiology, Prevention, and Control of Cancer 4

PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses* 4 *usually taken in Year 2

Term 4: PH.340.644 Epidemiology of Diabetes and Obesity 3

Skills Courses (can be taken Year 1 or later with commensurate progress in Biostats series)

Term 4: PH.340.600 Stata Programming (4th term, 2 credits) 2

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3

Advanced Methods Courses (recommended in Year 2, review course catalogue for prerequisites)

Term 1: PH.140.641 Survival Analysis 3

PH.140.776 Statistical Computing 3

PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

Term 2: PH.340.717 Health Survey Research Methods 4

Term 3: PH.140.655 Analysis of Multilevel and Longitudinal Data 4

PH.140.664 Causal Inference in Medicine and Public Health I 4

Recommended courses for Master's students with a focus in Cardiovascular Epidemiology

Term 1: PH.140.651 Methods in Biostatistics I 4

Term 2: PH.140.652 Methods in Biostatistics II 4

PH.340.620 Principles of Clinical Epidemiology 2

Term 3: PH.140.653 Methods in Biostatistics III 4

Term 4: PH.140.654 Methods in Biostatistics IV 4

Recommended courses for Master's students with a focus in Clinical Epidemiology

Term 2: PH.309.712 Assessing Health Status and Patient Outcomes 3

Term 3: PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4

PH.340.730 Assessment of Clinical Cardiovascular Disease 2

Term 4: PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology 2

PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology 2 *

(Incoming students with a U.S. medical degree will be waived automatically. Other students who believe they may qualify for a waiver from the requirement based on their previous course work should consult with the track director)

Clinical Trials and Evidence Synthesis**Courses Required for Master's Students in Clinical Trials and Evidence Synthesis****First Year**

Term 2: PH.340.645 Introduction to Clinical Trials 3

Term 3: PH.340.633 Data Management in Clinical Trials 3

Term 4: PH.340.648 Clinical Trials Management 3

Second Year

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4

PH.140.655 Analysis of Multilevel and Longitudinal Data 4

Recommended courses for Master's students in Clinical Trials and Evidence Synthesis**Course number / Course Name / Credits**

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.140.651 Methods in Biostatistics I 4

PH.221.722 Quality Assurance Management Methods for Developing Countries 4

PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

PH.390.631 Principles of Drug Development 2

PH.390.673 Ethical and Regulatory Issues in Clinical Research 3
 PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.140.630 Introduction to Data Management 3
 PH.140.652 Methods in Biostatistics II 4
 PH.340.717 Health Survey Research Methods 4
 PH.410.710 Concepts in Qualitative Research for Social and Behavioral Sciences 3

Term 3: PH.140.634 Non-Inferiority and Equivalence Clinical Trials 2
 PH.140.642 Design of Clinical Experiments 3
 PH.140.653 Methods in Biostatistics III 4
 PH.223.664 Design and Conduct of Community Trials 4
 PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1
 PH.340.775 Measurement Theory and Techniques in Epidemiology 4
 PH.140.664 Causal Inference in Medicine and Public Health I 4

Term 4: PH.140.654 Methods in Biostatistics IV 4
 PH.140.632 Introduction to the SAS Statistical Package 3
 PH.140.656 Multilevel and Longitudinal Models - Data Analysis Workshop 4
 PH.221.616 Ethics and Global Public Health Practice 2
 PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
 PH.224.691 Qualitative Data Analysis 3
 PH.390.675 Outcomes and Effectiveness Research 3

Summer Inst PH.330.621 Mixed Methods for Research in Public Health 2

Environmental Epidemiology

Course Required for Master's Students in Environmental Epidemiology First Year

Term 4: PH.340.680 Environmental and Occupational Epidemiology

Recommended courses for Master's students in Environmental Epidemiology Course number / Course Name / Credits

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.182.615 Airborne Particles 4
 PH.187.610 Public Health Toxicology 4
 PH.188.680 Fundamentals of Occupational Health 3
 PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.182.625 Principles of Occupational and Environmental Hygiene 4
 PH.317.610 Risk Policy, Management and Communication 3
 PH.340.624 Etiology, Prevention, and Control of Cancer 4
 PH.340.717 Health Survey Research Methods 4

Term 3: PH.180.601 Environmental Health 5
 PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

PH.317.605 Methods in Quantitative Risk Assessment 4

Term 4: PH.188.681 Onsite Evaluation of Workplace and Occupational Health Programs 5
 PH.317.615 Topics in Risk Assessment 2

Epidemiology of Aging

Courses Required for Master's Students in Epidemiology of Aging First Year

Term 1: PH.340.616 Epidemiology of Aging

Recommended courses for Master's students in Epidemiology of Aging Course number / Course Name / Credits

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

First Year

each term PH.330.802 Seminar on Aging, Cognition and Neurodegenerative Disorders 1

Term 1: PH.140.641 Survival Analysis 3
 PH.380.604 Life Course Perspectives on Health 4

Term 2: PH.340.620 Principles of Clinical Epidemiology 2
 PH.340.666 Foundations of Social Epidemiology 3
 PH.380.603 Demographic Methods for Public Health 4

Term 3: PH.340.699 Epidemiology of Sensory Loss in Aging 3
 PH.260.665 Biological Basis of Aging++ 3

Term 4: PH.330.623 Brain and Behavior in Mental Disorders 3
 PH.140.656 Multilevel and Longitudinal Models - Data Analysis Workshop 4
 PH.330.618 Mental Health in Later Life++ 3
 ++offered every other year

Second Year

Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4

PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
 PH.309.605 Health Issues for Aging Populations 3

Term 3: PH.140.655 Analysis of Multilevel and Longitudinal Data 4

General Epidemiology and Methodology

Courses Required for Master's Students in General Epidemiology and Methodology

First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4
 (recommended for year 1 but may be taken in year 2, satisfies the out-of-track requirement as well)

Term 2: PH.340.645 Introduction to Clinical Trials 3
 (recommended for year 1 but may be taken in year 2)

Terms 1 - 4: PH.340.875 GEM Research Seminar 1 (required for each student each term in year 1)

Second Year

CHOOSE AT LEAST TWO of these 3 courses in PH research skills:

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
 Term 2: PH.340.717 Health Survey Research Methods 4
 Term 3: PH.340.648 Clinical Trials Management 3

Recommended courses for Master's students in General Epidemiology and Methodology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Master's Students with a Methodology Focus:

Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4
 PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
 PH.340.616 Epidemiology of Aging 3
 PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
 PH.183.631 Fundamentals of Human Physiology 4
 PH.260.631 Immunology, Infection and Disease 3
 PH.330.603 Psychiatric Epidemiology 3
 PH.340.620 Principles of Clinical Epidemiology 2
 PH.340.624 Etiology, Prevention, and Control of Cancer 4
 PH.340.666 Foundations of Social Epidemiology* 3
 PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3: PH.140.640 Statistical Methods for Sample Surveys 3
 PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
 PH.222.647 Nutrition Epidemiology 3
 PH.224.690 Qualitative Research Theory and Methods 3
 PH.309.616 Introduction to Methods for Health Services Research and Evaluation I 2
 PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4
 PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3
 PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4: PH.140.656 Multilevel and Longitudinal Models - Data Analysis Workshop 4
 PH.224.691 Qualitative Data Analysis 3
 PH.309.617 Introduction to Methods for Health Services Research and Evaluation II 2
 PH.340.641 Healthcare Epidemiology 4
 PH.340.677 Infectious Disease Dynamics: Theoretical and Computational Approaches 3
 PH.340.680 Environmental and Occupational Epidemiology 4
 PH.380.664 Reproductive and Perinatal Epidemiology 4
 PH.390.675 Outcomes and Effectiveness Research 3

*alternates online and in-person every other year
 ++ alternate year course

Second Year courses:

Term 1: PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5
 Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
 PH.140.655 Analysis of Multilevel and Longitudinal Data 4
 PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4

Recommended statistical programming computing courses:

Term 1: PH.140.776 Statistical Computing 3
 Term 4: PH.140.632 Introduction to the SAS Statistical Package 3
 PH.340.600 Stata Programming 2

Master's Students with a Pharmacoepidemiology and Drug Safety Focus: Strongly Recommended courses for Master's Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.600 Introduction to the Risk Sciences and Public Policy 4
 PH.390.631 Principles of Drug Development 2

Term 2: PH.317.610 Risk Policy, Management and Communication 3

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
 PH.340.684 Pharmacoepidemiology: Drug Utilization 3 (alternate year format)
 PH.221.610 Pharmaceuticals Management for Under-Served Populations 3

Term 4: PH.410.680 Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions 3

Recommended courses for Master's Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.605 Methods in Quantitative Risk Assessment 4
 Term 4: PH.317.615 Topics in Risk Assessment 2

the following courses are offered outside of BSPH and require interdivisional registration and instructor permission

AS.410.651 Clinical Development of Drugs and Biologics 4
 AS.410.627 Translational Biotechnology: From Intellectual Property to Licensing 4
 ME.330.809 Analytic Methods for Clinical Pharmacology variable
 NR.110.508 Clinical Pharmacology 3

Individualized Focus:

Students designing their own educational programs should, in conjunction with their advisor, choose three to four graduate-level courses (taken for a letter grade) in their field from among the offerings of the University in addition to taking the GEM Required courses listed above.

Genetic Epidemiology

Courses Required for Master's Students in Genetic Epidemiology First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4
 Term 2: PH.340.732 Principles of Genetic Epidemiology 2 3
 Term 3: PH.340.733 Principles of Genetic Epidemiology 3 3
 Term 4: PH.340.734 Principles of Genetic Epi 4: Emerging and Advanced Methods 2

Second Year

Term 1: PH.120.602 Concepts of Molecular Biology (Pass/Fail, or Grade) 4

Recommended courses for Master's students in Genetic EpidemiologyAnalytic Methods Courses (ideal for year 2):

Term 1: PH.140.641 Survival Analysis 3
PH.140.651 Methods in Biostatistics I* 4
PH.140.776 Statistical Computing 3

Term 2: PH.140.638 Analysis of Biological Sequences 3
PH.140.652 Methods in Biostatistics II 4
PH.140.778 Statistical Computing, Algorithm, and Software Development 3
PH.340.774 Advanced Theory and Methods in Epidemiology* 4

Term 3: PH.140.644 Statistical Machine Learning: Methods, Theory, and Applications 4
PH.140.653 Methods in Biostatistics III 4
PH.140.655 Analysis of Multilevel and Longitudinal Data 4

Term 4: PH.140.688 Statistics For Genomics 3

Biology and Molecular Methods Courses:

Term 1: PH.260.611 Principles of Immunology I 4

Term 2: PH.260.612 Principles of Immunology II 4
PH.183.631 Fundamentals of Human Physiology 4 (*For non-physician trained students only)

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

Term 4: PH.120.608 Gene Editing, Therapy and Manipulation 3

Topic-Specific Electives:

Term 3: PH.340.775 Measurement Theory and Techniques in Epidemiology 4

Term 4: PH.330.619 Psychiatric Genomics 3
PH.415.624 Ethical, Legal and Social Implications in Genetics and Genomics Over Time 3 (offered in alternate years)

Infectious Disease Epidemiology**Courses Required for Master's Students in Infectious Disease Epidemiology****First Year**

Term 1: PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3

Students must complete at least one course in each of the four disciplinary sections below. Additional courses would be recommended.**Section one: General Electives: choose 1**

Term 1: PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.641 Healthcare Epidemiology 4

Term 2: PH.223.662 Vaccine Development and Application 4

Term 3: PH.182.640 Food- and Water- Borne Diseases 3
PH.223.663 Infectious Diseases and Child Survival 3
PH.223.687 Vaccine Policy Issues 3
PH.260.656 Malariology 4
PH.340.612 Epidemiologic Basis for Tuberculosis

Control 2

Term 4: PH.223.682 Clinical and Epidemiologic Aspects of Tropical Diseases 4

PH.223.689 Biologic Basis of Vaccine Development 3
PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4

PH.340.651 Emerging Infections 2
PH.380.761 Sexually Transmitted Infections in Public Health Practice 4
PH.380.762 HIV Infection in Women, Children, and Adolescents 4

Section two: Skills in Research: choose 1

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
Term 2: PH.340.717 Health Survey Research Methods 4

Section three: Biology and Pathogenesis of Disease: choose 1

Term 1: PH.260.623 Fundamental Virology 4
PH.260.636 Evolution of Infectious Disease 3
PH.340.654 Epidemiology and Natural History of Human Viral Infections 6
Term 3: PH.260.627 Pathogenesis of Bacterial Infections 4
PH.260.650 Vector Biology and Vector-Borne Diseases 3

Section four: Immunology: choose one set (recommended to complete in year two)

either:

Term 1: PH.260.611 Principles of Immunology I 4
and 2: PH.260.612 Principles of Immunology II* 4 cr each
*students requesting pass/fail for these two courses only must seek permission from their adviser and the track director

OR

Term 2: PH.260.631 Immunology, Infection and Disease 3

Department Comprehensive Examination

A two-day written departmental comprehensive examination is administered to all students enrolled in Epidemiology degree programs in late May of the first academic year. All students are required to sit for the exam on the scheduled dates—no alternate exams will be offered.

By the time of the examination, students should have completed 64 credits (one full year of residence), **the required first-year coursework in their Track with a cumulative GPA of at least 2.75**, and in these courses:

• Code	Title	Credits
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Select one of the following Biostatistics series:		16

PH.140.621 Statistical Methods in Public Health I
& PH.140.622 and Statistical Methods in Public Health II
& PH.140.623 and Statistical Methods in Public Health III
& PH.140.624 and Statistical Methods in Public Health IV

PH.140.651 Methods in Biostatistics I
& PH.140.652 and Methods in Biostatistics II
& PH.140.653 and Methods in Biostatistics III
& PH.140.654 and Methods in Biostatistics IV

The first day of the exam (Part A) includes testing on the following topics:

- Knowledge and application of epidemiologic concepts and methods (and related biostatistics)
- History of epidemiology
- Contemporary issues in public health
- Research ethics

The second day of the exam (Part B) is Track-specific and tests knowledge of concepts and methods presented in the required courses and activities for each Track, as well as the Department core courses as applied to the Track.

Students must pass both Part A and Part B of the comprehensive examination. Master's students must attain at least 70% on each Part A and Part B to pass. A repeat examination may be allowed but is not guaranteed. If a repeat is granted, it must be completed before starting the second academic year. Failure to pass one or both sections of the comps may result in dismissal from the master's program or from the Department.

Master's Thesis (MHS and Bachelor's/MHS)

Master of Health Science (MHS) students must complete a satisfactory thesis in their Track. The thesis must be approved by two members of the Department's faculty, including the thesis adviser. The thesis may be a critical review of the literature pertaining to a specific area of interest, secondary data analysis, program or project proposal, or original research. It is expected that the student will meet with their thesis adviser throughout the duration of the research project. MHS students planning on a May graduation must adhere to all program deadlines. The School's Policy and Procedures Memorandum (PPM) for the MHS degree program is available here (<https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx>), "Academic_Programs_08_Master_of_Health_Science_Degree_071417."

Students should follow the written guidelines for the preparation of the thesis. The thesis is a requirement for partial fulfillment of the MHS degree.

MASTER'S THESIS EXPECTATIONS

Epidemiology Bachelor's/MHS and MHS student theses will be evaluated in the following areas by both the faculty thesis adviser(s) and the second reader. In addition, the thesis adviser(s) will evaluate student's quarterly progress detailed in point 5 below.

Each student must register for 4 terms of Thesis Research Epidemiology with their thesis adviser in their second year. The thesis adviser(s), in consultation with the thesis reader, each student will be evaluated on whether their thesis shows:

1. Their understanding of the current state of the knowledge about the public health problem studied for the thesis is demonstrated by the student's descriptions and discussions of:
 - a. The descriptive epidemiology of the public health problem. For example, its prevalence and distribution in the population, and its risk factors (e.g., modifiable, non-modifiable, comorbidities, social, environmental risk factors, etc.).
 - b. The biology, physiology, and natural history of the public health problem, if relevant.
 - c. The contemporary questions about the public health problem, including new directions in research on the public health problem (including technology, diagnosis, and methodologic challenges).
 - d. The impact of the public health problem in the real world, with specific discussions about sub-populations or vulnerable populations that are particularly affected by the problem.
2. The student's ability to integrate and synthesize the current body of literature on the public health problem, and is demonstrated by:
 - a. Preparation of a comprehensive literature review (systematic review, if appropriate see separate document).
 - b. Interpretation of findings from multiple research papers and understanding of the full body of research relevant to the public health problem.
 - c. Interpretation of the student's own findings within the context of the current body of literature.
 - d. Use or evaluation of proper study design, measurement of exposures and/or outcomes, biases, and confounding, biostatistical methods, and application.
 - e. Explanation and interpretation of epidemiologic findings for a non-epidemiologist audience.
 - f. Identify next steps and future questions that need to be addressed.
 - g. Articulation of how the student's findings could be applied in order to affect or diminish the problem at a population (or sub-population) level.
3. The student's ability to prepare a thesis that is:
 - a. Logically structured and organized; and
 - b. Includes figures that illustrate important findings, with proper formatting (e.g. legends, labeled axes, appropriate titles, etc.); and
 - c. Includes tables that convey important findings, organized and formatted efficiently (e.g. appropriate titles, headings, footnotes, legends, etc.).
4. The student's ability to write a thesis that is grammatically accurate, including:
 - a. Correct punctuation and spelling; and
 - b. Easily readable by epidemiologists; and
 - c. Appropriately and adequately referenced citations; and
 - d. The student's own original work (please see Plagiarism modules).
5. The student's thesis adviser will evaluate the student on student professionalism, documented by:
 - a. Keeping appointments with the thesis adviser and being on time.
 - b. Being prepared and organized at each meeting with the thesis adviser, which includes creating and sending an agenda before the meeting.
 - c. Demonstrating appropriately paced progress on the thesis research.
 - d. Preparing the thesis document.

The expectation is that the student will improve in all aspects of their research during the course of the thesis work and work will show growth across the year culminating in the final thesis.

Master's Poster Session

All Master's students are required to participate in the Master's Poster Symposium held at the end of their 2nd year. Participation is a requirement for partial fulfillment of the Bachelor's/MHS and MHS degrees. Students prepare a 3'x4' portrait-oriented poster of their thesis work (no other work can be presented) and gain the approval of the poster from their adviser(s) before presenting. Although the research conducted for the poster will represent the Master's student's thesis, the adviser(s), and any other research colleagues, should be included as co-authors. In addition, any funding sources that supported the research directly or indirectly should be cited on the poster (in consultation with thesis adviser(s)). Additional guidelines for the creation of a scientific poster will be disseminated to students at the quarterly program meetings. Students are expected to follow these guidelines disseminated annually. Students should carefully proofread their posters prior to submitting them for printing.

A poster title and abstract should be submitted to the academic program manager (Justin Switzer) prior to the Master's Poster Symposium for inclusion in the program. Attendees at the Master's Poster Symposium include peers, staff, and faculty.

Students who will not graduate in May are still required to present a poster. This poster must be approved by their adviser(s) and presented to the Master's Program Director at least three weeks prior to the date by which the Department must certify student eligibility for the award of degree to the School's Office of Records and Registration. Students graduating in August or December must contact the Master's Program Director by July 1 (August graduation) or November 1 (December graduation) to indicate their plans to graduate and determine a poster presentation date.

The Policy and Procedures Manual for the Master of Health Science

The Department of Epidemiology reserves the right to augment the PPM (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_08_Master_of_Health_Science_Degree_071417.pdf) for BSPH. The Admissions and Credentials Committee handles most policy concerns as described above. The Curriculum Committee handles exceptions to requirements. Current students can access the Epidemiology Student Handbook on the MHS program page (<https://publichealth.jhu.edu/academics/mhs-dept-of-epidemiology/>) on the BSPH website.

For concerns and changes to advising, tracks, course requirements, etc. please see the academic policies for the department. (<https://e-catalogue.jhu.edu/public-health/departments/epidemiology/#departmentalpoliciestext>)

Compressed vs. Regular MHS Timeframes

Ideally formulated for BA and BS/MHS students, the compressed vs. regular timeframe permits highly focused and motivated students the opportunity to complete the degree requirements for the MHS program in a 14-month period.

Any student interested in completing the compressed program should discuss their research and career goals with the academic program manager and the BA/MHS Director or the MHS program co-directors.

MHS COMPRESSED TIMELINE

Admitted during summer prior to senior year at KSAS:

take Biostatistics 140.621 - 624 and Current Topics (4 terms) 340.860 during senior year

Summer prior to enrolling: Meet with Academic Program Manager, Justin Switzer, to connect with faculty for possible research projects. Begin discussing ideas for research.

Enrollment - Johns Hopkins Bloomberg School of Public Health:

Attend BSPH Orientation in August

First – Second terms: Continue required coursework **and** work on thesis proposal

During January, get approval from the thesis adviser for the proposed hypothesis, identify the dataset, and submit paperwork for IRB approval

Throughout the Third and Fourth terms: complete coursework **and** conduct research for the thesis

Participate in the Annual Poster Symposium (if ready)

Take the written departmental comprehensive exam (last Wednesday and Thursday at the end of May)

Summer after the first year: Register for 2 credits 340.820 with the adviser

Complete thesis

Prepare and present a poster of the research project (no later than July)
MHS completion and award of the degree at the end of August

Regular MHS timeline

Enrollment - Johns Hopkins Bloomberg School of Public Health:

Attend BSPH Orientation

First – fourth terms: Take course requirements and identify an adviser during the third term

During the fourth term, identify the research hypothesis and data set

Take the written departmental comprehensive exam (last Wednesday and Thursday at the end of May)

During summer, complete the IRB application and begin research

Fifth – eighth terms:

Take any remaining required or recommended coursework

Complete thesis

Prepare and present a poster of the research project at the end of April
MHS completion, award of the degree, and graduation occur in May of year two

Comprehensive Examination Grading Policy

The Departmental Written Comprehensive Examination is graded by the Department of Epidemiology faculty according to a rubric determined by the Comprehensive Examination Committee. Final results are distributed to students via CoursePlus by mid-July. Students who wish to view their exam should set up an appointment with the Senior Academic Coordinator, Ebony Moore (eamoore@jhu.edu).

Master's students whose results fall below 70% are allowed to submit a written request for a re-grade of specific questions. Re-grade requests must include a justification for a change in points allocated

for each question being contested; requests without appropriate justification will not be considered. Re-grade requests must have the adviser's endorsement who must have reviewed and approved the student's request. Re-grade requests are handled by the faculty on the Comprehensive Examination Committee. Adviser-approved requests can be e-mailed to the current year's Comprehensive Examination Committee Chair and must include a copy to the adviser. For approved requests, a new score will be assigned for each question that is re-graded. This score may be equal to, greater than, or less than, the original score awarded and cannot be contested a second time.

Additionally, MHS and Bachelor's/ MHS students may not commence research until they have successfully passed both part A and part B of the comprehensive examination.

Comprehensive Examination Retake Policy

Students who do not pass the Comprehensive Exam at the appropriate level for their degree program may be granted an opportunity for a retake in August following the May Exam. Students who do not pass the Comprehensive Exam at the appropriate level are not automatically granted a retake. To request a retake, students must submit an official request within two weeks of notification of the not passing grade. This request should include a detailed timeline and study plan, to make the case for passing a retake. This request and plan must be endorsed by, and developed with, the adviser. Retake requests are reviewed via the Department's Admissions and Credentials Committee. Adviser-approved requests can be e-mailed to the current year's Admissions and Credentials Committee Chair and must include a copy to the adviser and Senior Academic Program Manager (Frances Burman). For approved requests, students are granted one retake only, and it must be in August immediately following the May Exam. A student cannot continue in the degree program without passing the Comprehensive Examination at the appropriate level, prior to the start of the second year.

Recommendations for Special Studies versus Thesis Research

Special Studies and Research in Epidemiology, PH.340.840.xx, is offered during terms 1, 2, 3, and 4. Thesis Research, PH.340.820.XX is offered terms S, 1, 2, 3, and 4.

Special Studies and Research: PH.340.840.XX

All first-year MHS and SCM students should take 1 credit special studies and research each term during terms 1 -3.

The following list of activities may be approved for independent study or special studies and research and is not inclusive:

- Directed readings and discussions leading up to preparing for the research proposal,
- Literature searches and meta-analyses
- Secondary data analysis
- Self-guided focused study on a particular methodology or a disease of interest

Thesis Research: PH.340.820.XX

Master's students take 340.820 once they begin working on their research thesis. Students may begin registering for thesis research as early as the fourth term of the first year once their adviser selection is confirmed. MHS students must take a minimum of 2 credits of thesis research for two terms during their program.

Calculating credits for a variable credit course:

- Students must remember that the 1 hour – in class, 2 hours – outside of class ratio still applies: e.g. Students should think about the time the faculty member will be involved in guiding them (see faculty contact hours below) as well as how much time the student uses to conduct outside readings and work.

What constitutes Faculty Contact Hours?

- Individual one-on-one meetings
- Faculty revisions of writing projects (faculty members spend considerable time editing, proofreading, and otherwise providing feedback to students.)
- Mentoring and networking preparation and discussion.
- Time spent in group settings with a faculty mentor e.g. journal clubs or weekly "lab/group" meetings. Students should make every effort to attend the group meetings for their track and adviser.

How to Register?

- Students must communicate their intent to register with and receive approval from the faculty mentor in writing, prior to registering for credits for the special studies or thesis research and include the content/activities to be conducted and the number of credits.
- Students may take 1-3 credits while taking a full load of courses.
- Students may take up to 8 credits per term while taking a partial load of courses with the approval of the faculty mentor.
- Students must meet with the faculty mentor before or during add/drop to discuss objectives.

Adviser / Advisee Manual [subject to change]

Each student in the Department is assigned an adviser and selects co-adviser(s) as they move through the program; Adviser(s) have the responsibility of serving as a guide and mentor. This manual is intended to guide the student and the faculty member(s) in making the adviser/advisee relationship as successful as possible.

This manual has two goals:

- To provide answers to questions that students frequently ask and,
- To provide guidance on how the student and adviser can interact most effectively

Academic Advisers should:

- Provide oversight of the student's academic progress by:
 - Assisting in the selection of courses
 - Ensuring the student is meeting degree milestones in a timely manner
 - Being available for regular meetings with the student
 - Assessing and developing the student's interests and abilities
 - Monitoring student progress in academic coursework through periodic examination of transcripts
 - Monitoring student progress in fieldwork
 - Writing letters of reference (given appropriate lead time)
 - Assisting with grant preparation (doctoral students, given appropriate lead time)
 - Referring students to the appropriate individuals or offices that provide academic support and/or resources
- Provide leadership in matters of academic integrity:
 - Being knowledgeable about ethical issues that pertain to academics, research, and practice

- Helping students interpret and understand institutional policies and procedures regarding the responsible conduct of research
- Discouraging students from circumventing institutional policies and procedures, and when confronted with such issues, directing students to appropriate institutional resources or contacts, avoiding actual or appearance of conflicts of interest
- Respecting the confidentiality of students
- Encourage active participation in the greater community (department, school, university, local, state, national, and international)

STUDENTS MAY EXPECT THE FOLLOWING FROM THEIR ADVISER(S):

- Advisers' approval for course registrations, course changes, and pass/fail agreements, and on all reasonable petitions to the Admissions and Credentials Committee
- At least one meeting per term with the advisers
- Oversight of the student's overall academic program and sensitivity to any academic difficulties
- Knowledge of and interest in the student's career objectives
- Review of required and recommended courses for the track
- Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year

Advising students is an integral part of faculty members' responsibilities. Faculty members expect to be able to meet with students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. The responsibility for arranging meetings lies with the student. Students should not expect advisers to seek them out for needed appointments. The student remains obligated to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline.

RIGHTS AND RESPONSIBILITIES OF THE ADVISER(S)**:

- To assist in determining the advisee's educational goals and needs upon starting the program
- To serve as an educational and/or professional mentor for the student
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and the advisers in terms of academic, professional, and personal interests
- To facilitate a change of adviser or program, if deemed appropriate for the student
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty
- To provide guidance throughout the academic program
- To be sensitive to cultural, medical, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be aware, sensitive, understanding, and supportive
- Advisers have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be consulted when students have questions or concerns about the research focus or progress, and to serve as team leader on the research team

RIGHTS AND RESPONSIBILITIES OF THE ADVISEE**:

- To arrange to meet with the adviser at least once each term, and observe registration and administrative deadlines
- To identify and develop professional career goals and interests

- To access and demonstrate knowledge of administrative policies and procedures and be familiar with the content in the Student Handbook
- To maintain the academic checklist and review it at meetings with the advisers
- Advisees have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be notified when advisers have questions or concerns about the research focus or progress, and to be granted the role of a team member on the research team

****Students and Faculty each have the right to request changes to the adviser/advisee relationship upon consultation with the Director of Graduate Education (Laura Camarata) without penalty.**

According to the requirements of the Council on Education for Public Health (CEPH), all BSPH degree students must be grounded in foundational public health knowledge. Please view the list of specific CEPH requirements by degree type (<https://e-catalogue.jhu.edu/public-health/ceph-requirements/>).

Epidemiology (<https://publichealth.jhu.edu/departments/epidemiology/>) Master of Health Science Degree Program (<https://publichealth.jhu.edu/academics/mhs-dept-of-epidemiology/>) competencies are designated by track and are charted below. Mastery is achieved by completing the program requirements. (p. 1) Please direct questions to the track directors, program directors, director of graduate education (<https://publichealth.jhu.edu/faculty/3494/laura-camarata/>), or the program manager (jswitze4@jhmi.edu).

Cancer Epidemiology

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.
2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.
3. Identify the major risk factors for common cancers and effective strategies for cancer prevention and control at the population level.
4. Describe and discuss differences between key types of studies (e.g., linkage and association studies, family-based and population-based studies, direct and indirect association studies) in their application to cancer epidemiology research.
5. Discuss methodological and study design problems in applying biomarkers in epidemiological studies of cancer.
6. Interpret key findings from presentations that cover current topics in modern cancer epidemiology.

Cardiovascular and Clinical Epidemiology

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.
2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.
3. Describe the symptoms and risk factors for cardiovascular (and other major chronic) diseases; pathophysiologic processes and biological mechanisms involved in those diseases; and techniques

(e.g., echocardiography, CT scan, and MRI) used to detect and quantify the presence of those diseases.

4. Describe study designs (cohort, case-control, clinical trials, meta-analyses) and data sources (observational, experimental, routinely collected clinical and administrative data) that are used to study cardiovascular and major chronic diseases. Discuss the advantages and disadvantages of these study designs and data sources with respect to clinical and cardiovascular disease epidemiology.

5. Discuss the societal and public health impact of cardiovascular and major chronic diseases. Identify treatment strategies, disease management options, and strategies for primary and secondary prevention of cardiovascular and major chronic diseases.

6. Interpret key findings from presentations that cover current topics in modern cardiovascular disease epidemiology.

clinical trials and evidence synthesis

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.

2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.

3. Assess methods for the design, conduct, and analysis of randomized controlled trials. Assess methods for synthesizing evidence using epidemiological tools such as systematic reviews, meta-analysis, and network meta-analysis.

4. Describe the practical skills required to coordinate/manage a multicenter clinical trial such as writing effective study materials and recruitment and retention of participants. Identify key trial documents including the protocol, manual of procedures/handbook, performance monitoring reports, and adverse event reports.

5. Apply the principles of the acquisition, management, and distribution of data in clinical trials. Evaluate alternative courses of action and policies regarding data collection and management issues in a trial.

6. Interpret key findings from presentations that cover current topics in clinical trials and epidemiological methods.

environmental epidemiology

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.

2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.

3. Recognize the epidemiology of diseases associated with environmental, industrial, and occupational exposures.

4. Develop basic assessment strategies for environmental and occupational exposures.

5. Identify risk assessment principles in studies of occupational and environmental epidemiology.

6. Interpret key findings from presentations that cover current topics in modern environmental epidemiology.

Epidemiology of Aging

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.

2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.

3. Describe the public health significance of an aging population.

4. Describe and synthesize the epidemiology of major adverse outcomes in older adults not only restricted to incident diseases and mortality, but also including geriatric syndromes (e.g., frailty, falls, sensory loss), and functional outcomes (e.g., physical disability, cognitive impairment, and sensory impairment).

5. Identify the epidemiologic implications of key health-related aging concepts, including heterogeneity of health status, comorbidity burden, subclinical disease, compression of morbidity, disability, and frailty.

6. Interpret key findings from presentations that cover current topics in modern epidemiology of aging.

General Epidemiology and Methods

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.

2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.

3. Design, organize, analyze, and interpret observational and experimental studies. Interpret the effects of complex mechanisms involving bias and variability.

4. Delineate the influences of social processes on the etiology and course of common diseases by constructing a framework that underscores the roles of key social conditions on the health and illness of populations.

5. Interpret and describe advanced design methods applied to epidemiologic research.

6. Interpret key findings from presentations that cover current topics in modern epidemiology methodology.

Genetic Epidemiology

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.

2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.

3. Demonstrate and apply key components and concepts of human molecular biology and genetics.

4. Design, implement, and interpret genetic epidemiology studies.

5. Write computer scripts and utilize statistical and genomic software to carry out genomic analyses.

6. Interpret key findings from presentations that cover current topics in modern genetic epidemiology.

Infectious Disease Epidemiology

1. Identify and distinguish epidemiologic study designs, including the use of population health measures, measures of association, and appropriate analytic models.
2. Discuss core applied statistical concepts and methods, as well as the display and communication of statistical data.
3. Describe the taxonomy of infectious agents and their distinguishing microbiological features.
4. Define and calculate basic concepts to describe the natural history of infectious diseases.
5. Identify strategies such as surveillance and contact tracing for infection control and outbreak control.
6. Interpret key findings from presentations that cover current topics in modern infectious disease epidemiology.