Epidemiology — M.P.H.

Program Directors
Khaled Bahjri
David Shavlik

The program leading to an M.P.H. degree in epidemiology provides theoretical and practical training applicable to a variety of public health issues. Two concentrations are offered by the program, and each is designed to meet a particular professional need.

Learner outcomes
Upon completion of this program, the graduate should be able to:

- Assist in design and implementation of health research studies - including formulating research questions, appropriate study design, data collection, statistical analyses, interpretation, and reporting of results.
- Collaborate with or serve as a research consultant to health professionals.
- Be familiar with disease surveillance and response, and with basic screening theory.
- Critically review the health literature.
- Have experience with contemporary advancements in epidemiologic methods (research epidemiology).
- Demonstrate understanding of the basic theory and practice of clinical trials (medical epidemiology).

Educational effectiveness indicators
Program learner outcomes as evidenced by:

- Signature assignments linked to course and non-course requirements
- Field practicum report
- Culminating experience (http://llucatalog.llu.edu/public-health/masters-degrees/#mphtext)

Prerequisite
In addition to the entrance requirements for all MPH degrees (http://llucatalog.llu.edu/public-health/masters-degrees/#admissionstext), applicants to the MPH program in Epidemiology must have:

- College algebra or equivalent (calculus preferred)
- Behavioral science (one course)
- Additional prerequisites specific to chosen concentration

Concentrations

Medical Epidemiology
The M.P.H. degree in medical epidemiology specifically targets health professionals (e.g., MD, nurses, PT, OT, pharmacists) who are interested in becoming proficient in research or in practicing epidemiology in a public health setting (e.g., public health department, CDC, cancer registries, WHO), or clinical setting (hospital epidemiologists).

Concentration-specific prerequisite in addition to prerequisites required for the degree:

- Clinical health professional degree, including but not limited to medicine, osteopathy, dentistry, nursing, clinical psychology, pharmacy, or physical therapy; or training as a nurse practitioner, physician assistant, chiropractor, licensed exercise physiologist, or registered dietitian. Must have completed at least two years in a clinical program.

Research Epidemiology
Research epidemiology is designed for persons interested in a career studying the relationship of risk factors to a variety of disease outcomes (e.g., the effect of nutrients, inactivity, stress, high blood pressure, environmental exposure, obesity, heart disease, cancer, osteoporosis, longevity, infectious diseases, reproductive outcomes, etc.).

Concentration-specific prerequisites in addition to prerequisites required for the degree:

At least four of the following courses:

- Anatomy and physiology
- Cancer biology
- Cell biology
- Embryology
- General biology
- Genetics
- Histology*
- Human anatomy*
- Human physiology*
- Immunology*
- Microbiology*
- Molecular biology
- Pathology*
- Vertebrate anatomy
- Zoology

* Preferred

Program requirements

Medical epidemiology concentration

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<th>Public health core</th>
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**Cognates/Electives**
Choose from defined cognates or select from electives

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<thead>
<tr>
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**Research project**

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**Field experience**
Practicum units are in addition to the minimum didactic units required for the degree

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<th>Course Code</th>
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<tbody>
<tr>
<td>PHCJ 798A</td>
<td>Public Health Practicum (2 units)</td>
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Total Units 57

1 Chosen in consultation with advisor

### Research epidemiology concentration

**Corequisite 1**

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<tbody>
<tr>
<td>NUTR 504</td>
<td>Nutritional Metabolism (or Biochemistry)</td>
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**Public health core**

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<td>Public Health for Community Resilience</td>
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<td>PCOR 502</td>
<td>Public Health for a Healthy Lifestyle</td>
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<td>PCOR 503</td>
<td>Public Health and Health Systems</td>
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**Major**

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<tr>
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<td>EPDM 510</td>
<td>Epidemiologic Methods I</td>
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<td>EPDM 511</td>
<td>Epidemiologic Methods II</td>
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<td>Grant- and Contract-Proposal Writing</td>
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<td>STAT 522</td>
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<td>STAT 557</td>
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<td>EPDM 565</td>
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<td>EPDM 566</td>
<td>Epidemiology of Cardiovascular Disease</td>
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<td>EPDM 515</td>
<td>Clinical Trials</td>
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<td>EPDM 555</td>
<td>Epidemiologic Methods in Outcomes Research and</td>
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<td>Continuous Quality Improvement</td>
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**Religion**

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<td>RELE 534</td>
<td>Ethical Issues in Public Health (or REL__)</td>
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<tr>
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<tr>
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<td>Public Health Practicum (2 units)</td>
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Total Units 62

1 Not included in total units, may be met prior to acceptance.
2 Chosen in consultation with advisor

### EPDM/STAT forums

During their program, students are required to attend a minimum of fifteen forums in epidemiology, biostatistics, and/or in the Adventist Health Study.

### Culminating experience


* For two of the three options, students in the Epidemiology MPH program will be required to deliver an oral presentation and prepare a manuscript.

### Normal time to complete the program

Medical Epidemiology concentration — 2 years (8 academic quarters) based on full-time enrollment; part time permitted

Research Epidemiology concentration — 2.33 years (9 academic quarters) based on full-time enrollment; part time permitted

### Courses

**EPDM 414. Introduction to Epidemiology. 3 Units.**

Methods and strategies used to investigate distribution, determinants, and prevention of disease in human populations. Disease classification, measures of disease frequency and relative effect, and methods used to isolate effects. Assessments of environmental conditions, lifestyles, and other determinants of disease. Interpretation of results and statistical associations. Critical evaluation of scientific literature. Student presents personal literature study. Laboratory included.

**EPDM 505. Principles of Epidemiology MBA. 3 Units.**

Distribution and determinants of health events and disease outcomes in human populations. Assessments of environmental conditions, lifestyles, various treatments, and other circumstances influencing disease and disease prognosis. Measures of disease outcomes and frequency, and use of these measures in health care. Major types of epidemiological investigation. Interpretation of statistical associations. Study of how to read and critically evaluate scientific literature. Presentation of personal literature study. Laboratory included.

**EPDM 509. Principles of Epidemiology. 3 Units.**

Outlines the principles and methods used to investigate the distribution, determinants, and prevention strategies for disease in human populations. Major topics include: measures of disease frequency; measures of effect; measures of potential impact; comparison and contrast of study designs; methods to identify and control confounding; methods to improve validity, information, and selection bias; methods to assess causation, evaluate statistical significance, evaluate screening for latent disease, and interpret results. Laboratory included.
EPDM 510. Epidemiologic Methods I. 3 Units.
First course in a three-course epidemiologic methods sequence. Covers causation, study design, validity, confounding, and interaction. Includes causal inference; basic study designs (descriptive and analytic designs, age-cohort-period effects, ecologic studies); disease frequency measures; exposure-disease associations measures, validity (information bias, selection bias, internal and external validity, duration ratio bias, point prevalence complement ratio bias, bias in screening, publication bias); methods for correcting for bias (selection ratios, correction for measurement error, introduction to calibration studies); methods of assessment of validity and reliability (i.e., correlations, Bland-Altman plot, intraclass correlation, coefficient of variability, percent agreement, kappa, sensitivity analysis); advanced topics on confounding, interaction, stratification, and adjustment. Includes problem sets, analysis of epidemiologic data (SAS & R), and case studies based on reports from epidemiology journals.

EPDM 511. Epidemiologic Methods II. 3 Units.
Second course in the epidemiologic methods sequence. Advanced study designs and multivariable modeling of exposure-disease relationships. Focuses on hybrid designs (nested case control, case cohort, and case crossover) and incomplete designs (proportion, ecologic, spatial studies). Multivariable modeling modules introduce generalized linear models (emphasizing linear, logistic, and Poisson) and maximum likelihood theory. Model-building approach includes causal diagrams, methods of variable selection and specification, testing for confounding and interaction, and trend testing. Multivariable modeling of prospective cohort study data with Cox proportional hazard modeling includes coverage of survival analysis concepts (nonparametric survival analysis, life tables, hazard and survival functions). Models nonproportional hazards in a survival analysis. Includes exercises that focus on writing up and presenting the findings from multivariable modeling for submission to biomedical journals; as well as problem sets, data analysis (SAS & R), case studies based on reports from the epidemiology journals, and written reports.

EPDM 512. Epidemiologic Methods III. 3 Units.
Third course in the epidemiologic methods sequence. Uses case studies of material from the preceding courses to provide experience analyzing epidemiologic data. Covers advanced methods of epidemiologic investigation, including advanced causal inference, spline regression, measurement error correction, multiple imputation, complex survey design and analysis (stratified multistage cluster designs), and meta-analysis. Final module includes power and sample size calculations for the regression models covered during the course sequence. Includes readings (textbook and recent journal articles on epidemiologic methods); data analysis in a computer laboratory setting using SAS, R, and SUDAAN; and case studies based on reports from epidemiology journals.

EPDM 515. Clinical Trials. 3 Units.
Theory and practice of intervention studies, including community and clinical trials. Course includes components of a trial protocol, different types of trial design, analysis methods, and ethical considerations.

EPDM 525. Special Topics in Epidemiology. 1-4 Units.
Lecture and discussion on a current topic in epidemiology. May be repeated for a maximum of 4 units applicable to degree program.

EPDM 528. Applied Epidemiology and Clinical Preventive Services. 3 Units.
Applied epidemiology concepts for acute and chronic diseases for which prevention is available. Includes concepts in infectious disease epidemiology, chronic disease epidemiology, and recommendations for clinical preventive services, such as screening, prophylaxis, counseling, and immunizations.

EPDM 534. Epidemiology of Maternal-Child Health. 3 Units.
Applies epidemiologic issues to maternal and child health topics, emphasizing analysis and interpretation of data. Introduces key studies and standard data sets used to describe and compare maternal and child health outcomes both domestically and globally. Includes framework for critical review of studies in the field. Limited to maternal and child health, epidemiology, and doctoral students; or consent of instructor.

EPDM 544. Epidemiology of Infectious Disease. 3 Units.
Introduces the fundamental epidemiologic concepts, methods, and principles in the study of infectious diseases of public health significance. Emphasizes “old” diseases that remain real or potential problems; diseases with changing ecology due to the development of drug/vector resistance and advances in treatment, immunizations, and other preventive/control measures; and emerging and re-emerging diseases that have increasingly become problems through the evolution of modern society. Discusses the role of surveillance systems in infection control in varied settings. Explores the potential of developing appropriate public health interventions in the context of prevention, control, and possibly eradication programs.

EPDM 555. Epidemiologic Methods in Outcomes Research and Continuous Quality Improvement. 3 Units.

EPDM 556. Epidemiologic Methods in Patient Safety Research. 3 Units.
Utilizes patient safety videos, case-based small- and large-group discussions, interactive exercises, and selected readings to focus on concepts and research related to the importance of patient safety, the human and financial cost of medical error around the world, and basics of the psychology of error. Guides student in the process of conducting patient safety research: selection of most appropriate research method, choice of tools that complement the chosen research method, identification of available resources, and consideration of research protocols. Increases awareness of the scope and magnitude of the problem of patient safety in healthcare, stimulates discussion relative to specific problems, and emphasizes key patient safety concepts. Focuses on the human factor in patient safety and the importance of interprofessional teamwork in developing a culture of safety within health-care organizations. Emphasizes root cause analysis of safety problems—including human factors, malfunctioning equipment, and unsafe practices and protocols. Discusses the importance of disclosing errors and apologizing to parties involved, as appropriate.
EPDM 564. Epidemiology of Chronic Diseases. 3 Units.
Provide a critical review of the epidemiology of the leading chronic
diseases, including cardiovascular disease, cancer, and diabetes.
Acquaints students with coding systems for the diseases. Emphasizes
research that relates to control and prevention of these diseases.
Acquaints students with experimental designs and analytic techniques
commonly used in chronic disease epidemiology. Discusses experimental
and epidemiologic evidence relating risk factors such as diet, smoking,
exercise, and biologic variables; as well as interactions between genes
and environment to these chronic diseases. Incidence, secular trends,
burden, mortality, survival, and surveillance as they relate to chronic
diseases. Brief overview of anatomy, pathology/morphology of these
diseases.

EPDM 565. Epidemiology of Cancer. 3 Units.
Critically reviews epidemiology of the major causes of cancer occurrence
and death in developed nations, including anatomic (ICD-9 and ICD-0-2/3)
and morphologic/pathogenic (ICD-0-2/3) classifications schemes.
Emphasizes research and health-promotion issues that relate to control
and prevention of cancer. Topics include pathology vocabulary; multistage
model of carcinogenesis; sources of cancer data; validity and value of
population measures of cancer; magnitude of the cancer problem; trends
in cancer frequency, incidence, mortality, and survival; surveillance
objectives and methods; consistent risk and protective factors for major
cancer types; the role of infectious diseases in cancer etiology and
progression; nutrition and cancer; screening objectives, recommendations,
and controversies; and interactions between environmental and genetic
characteristics in cancer causation.

EPDM 566. Epidemiology of Cardiovascular Disease. 3 Units.
Descriptive epidemiology of the major cardiovascular diseases, including:
myocardial infarction, sudden death, angina pectoris, hypertension, and
stroke. Acquaintance with experimental designs and analytic techniques
commonly used in cardiovascular epidemiology. Experimental and
epidemiologic evidence relating risk factors such as diet, smoking,
blood lipids, blood pressure, and exercise to cardiovascular diseases.
Acquaintance with the design and results of the major intervention studies.

EPDM 567. Epidemiology of Aging. 3 Units.
Global demographic trends, determinants, and measures of population-
age structure. Health, morbidity, disability, and mortality; comprehension
of morbidity and mortality; mechanisms, biomarkers, and genetics of aging.
Aging research: surveys, clinical trials, and ethics. Chronic conditions/
diseases (i.e., dementia, musculoskeletal conditions, osteoporosis,
obesity, diabetes, cardiovascular disease); risk factors (i.e., diet, smoking,
physical activity); and prevention. Economic aspects, drug use. Laboratory
includes critical evaluation of current literature reports.

EPDM 568. International Epidemiology. 2 Units.
Introduces research methods for conducting global health surveys using
complex sampling techniques (cluster sampling, lot quality-assurance
sampling). Exercises include data analysis and programming with EPI
INFO, survey design, and geographic information systems.

EPDM 588. Environmental and Occupational Epidemiology. 3 Units.
Evaluates epidemiologic principles and methodologic approaches used in
the assessment of environmental exposure, selection of applicable study
designs, and determination of analytic methods used in the investigation
of environmental health problems within populations. Epidemiologic
analysis of selected and controversial environmental exposures that
impact significantly on public health practice and on disease morbidity and
mortality outcomes.

EPDM 605. Seminar in Epidemiology. 1 Unit.
Presentations and discussions of topics of current interest in epidemiology
and statistics. Doctoral students work in groups on topics selected at the
beginning of the quarter. Requires a written report and oral presentation
at the completion of a project. Seminar facilitates maximal interaction
among doctoral students and faculty to facilitate professional development.
Students required to enroll Fall Quarter each year they are in the program,
but attendance and participation are required Fall, Winter, and Spring
quarters.

EPDM 606. Doctoral Seminar in Epidemiology. 1 Unit.
Presentations and discussions of topics of current interest in epidemiology
and statistics. Doctoral students work in groups on topics selected at the
beginning of the quarter. Requires a written report and oral presentation
at the completion of a project. Seminar facilitates maximal interaction
among doctoral students and faculty to facilitate professional development.
Students required to enroll Fall Quarter each year they are in the program;
but attendance and participation required Fall, Winter, and Spring
quarters.

EPDM 625. Special Topics in Epidemiology. 1-3 Units.
Lecture and discussion on a current topic in epidemiology. May be
repeated for a maximum of 6 units applicable to degree program.
Recommended for doctoral students.

EPDM 635A. Epidemiological Studies of Seventh-day Adventists A. 1
Unit.
Background, objectives, methodologies, results, and public health
implications of most epidemiological studies conducted on Seventh-day
Adventists worldwide, but especially in California. Data on the health
behaviors and health/disease experience of this low-risk population.
Discussion of potential biases and other issues.

EPDM 635B. Epidemiological Studies of Seventh-day Adventists B. 1
Unit.
Discusses methodological issues pertinent to studies of Adventists,
including the evidence for the longevity of California Adventists.
Student critically evaluates current literature on epidemiologic studies of
Adventists—including a thorough discussion of lifestyle, selection, and
survival hypotheses—and presents findings during a discussion session.
Student writes a scholarly paper on one topic relevant to epidemiologic
studies among Adventists.

EPDM 682A. Seminar in Preventive Medicine. 1 Unit.
Provides an overview of preventive medicine topics. Includes a framework
for critical review of scientific literature, as well as opportunities to develop
additional necessary professional skills. General guidance in development
of a research project, including design, analysis, and interpretation.
Restricted to preventive medicine residents.

EPDM 682B. Seminar in Preventive Medicine. 1 Unit.
Provides an overview of preventive medicine topics. Includes a framework
for critical review of scientific literature, as well as opportunities to develop
additional necessary professional skills. General guidance in development
of a research project, including design, analysis, and interpretation.
Restricted to preventive medicine residents.

EPDM 682C. Seminar in Preventive Medicine. 1 Unit.
Provides an overview of preventive medicine topics. Includes a framework
for critical review of scientific literature, as well as opportunities to develop
additional necessary professional skills. General guidance in development
of a research project, including design, analysis, and interpretation.
Restricted to preventive medicine residents.
EPDM 682D. Seminar in Preventive Medicine. 1 Unit.
Provides an overview of preventive medicine topics. Includes a framework for critical review of scientific literature, as well as opportunities to develop additional necessary professional skills. General guidance in development of a research project, including design, analysis, and interpretation. Restricted to preventive medicine residents.

EPDM 683A. Preventive Medicine in Public Health. 1 Unit.
Includes advanced concepts in epidemiology for the public health professional. Provides an opportunity for development of leadership and presentation skills. Restricted to preventive medicine residents.

EPDM 683B. Preventive Medicine in Public Health. 1 Unit.
Includes advanced concepts in epidemiology for the public health professional. Provides an opportunity for development of leadership and presentation skills. Restricted to preventive medicine residents.

EPDM 683C. Preventive Medicine in Public Health. 1 Unit.
Includes advanced concepts in epidemiology for the public health professional. Provides an opportunity for development of leadership and presentation skills. Restricted to preventive medicine residents.

EPDM 683D. Preventive Medicine in Public Health. 1 Unit.
Includes advanced concepts in epidemiology for the public health professional. Provides an opportunity for development of leadership and presentation skills. Restricted to preventive medicine residents.

EPDM 685. Preliminary Research Experience. 2 Units.
Experience gained in various aspects of research under the guidance of a faculty member and by participation in an ongoing project. Must be completed prior to beginning dissertation research project. Limited to doctoral degree students.

EPDM 692. Research Consultation. 1-4 Units.
Individual advice on project design, data collection, analysis, and evaluation. Restricted to School of Public Health students and staff.

EPDM 694. Research. 1-14 Units.
Independent epidemiologic research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 696. Directed Study/Special Project. 1-4 Units.
Individual arrangements for advanced students to study under the guidance of a faculty member. May include readings, literature reviews, or other special projects. Minimum of thirty hours required for each unit of credit. A maximum of 4 units applicable to any master's degree program.

EPDM 697. Dissertation Proposal. 1-10 Units.
Student develops the written dissertation proposal. Doctoral dissertation committee chairman works with the student on mutually agreed-upon objectives. Evaluation based on the accomplishment of these objectives. Culminates in a written and oral dissertation proposal defense and advancement to candidacy. Doctoral students only.

EPDM 698. Dissertation. 1-14 Units.
Based on the doctoral research study, student writes a dissertation in submitted-paper format, submits the individual manuscripts to scientific journals, and responds to reviewers' comments.

EPDM 699A. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 699B. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.

EPDM 699C. Applied Research. 1 Unit.
Independent epidemiologic research. Research program arranged with faculty member(s) involved. Written report and oral presentation required.